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OPERATION AND MAINTENANCE MANUAL

for

JET-EX 4D

GENERATOR SETS

Series 6854 and Series 6854A

Specification 6854-1
Specification 6854A-1
Specification 6854A-2

HOBART BROTHERS COMPANY
POWER SYSTEMS DIVISION
TROY, OHIO 45373
U.S.A.

⚠ WARNING

ELECTRIC SHOCK can kill. Do not touch live electrical parts.

ELECTRIC ARC FLASH can injure eyes, burn skin, cause equipment damage, and ignite combustible material. Do not use power cables to break load and prevent tools from causing short circuits.

IMPROPER PHASE CONNECTION, PARALLELING, OR USE can damage this and attached equipment.

IMPORTANT: - Protect all operating personnel. Read, understand, and follow all instructions in the Operating/Instruction Manual before installing, operating, or servicing the equipment. Keep the manual available for future use by all operators.

A. GENERAL

Equipment that supplies electrical power can cause serious injury or death, or damage to other equipment or property. The operator must strictly observe all safety rules and take precautionary actions. Safe practices have been developed from past experience in the use of power source equipment. While certain practices below apply only to electrically-powered equipment, other practices apply to engine-driven equipment, and some practices to both.

B. SHOCK PREVENTION

Bare conductors, or terminals in the output circuit, or ungrounded, electrically-live equipment can fatally shock a person. Have a certified electrician verify that the equipment is adequately grounded and learn what terminals and parts are electrically HOT. Avoid hot spots on machine. Use proper safety clothing, procedures, and test equipment.

The electrical resistance of the body is decreased when wet, permitting dangerous currents to flow through it. When inspecting or servicing equipment, do not work in damp areas. Stand on a dry rubber mat or dry wood, use insulating gloves when dampness or sweat cannot be avoided. Keep clothing dry, and never work alone.

1. Installation and Grounding of Electrically Powered Equipment

Equipment driven by electric motors (rather than by diesel or gasoline engines) must be installed and maintained in accordance with the National Electrical Code, ANSI/NFPA 70, and other applicable codes. A power disconnect switch or circuit breaker must be located at the equipment. Check the nameplate for voltage, frequency, and phase requirements. If only 3-phase power is available, connect any single-phase rated equipment to only two wires of the 3-phase line. DO NOT CONNECT the equipment grounding conductor (lead) to the third live wire of the 3-phase line, as this makes the equipment frame electrically HOT, which can cause a fatal shock.

Always connect the grounding lead, if supplied in a power line cable, to the grounded switch box or building ground. If not provided, use a separate grounding lead. Ensure that the current (amperage) capacity of the grounding lead will be adequate for the worst fault current situation. Refer to the National Electrical Code ANSI/NFPA 70 for details. Do not remove plug ground prongs. Use correctly mating receptacles.

2. Output Cables and Terminals

Inspect cables frequently for damage to the insulation and the connectors. Replace or repair cracked or worn cables immediately. Do not overload cables. Do not touch output terminal while equipment is energized.

3. Service and Maintenance

This equipment must be maintained in good electrical and mechanical condition to avoid hazards stemming from disrepair. Report any equipment defect or safety hazard to the supervisor and discontinue use of the equipment until its safety has been assured. Repairs should be made by qualified personnel only.

Before inspecting or servicing electrically-powered equipment, take the following precautions:

a. Shut OFF all power at the disconnecting switch or line breaker before inspecting or servicing the equipment.

b. Lock switch OPEN (or remove line fuses) so that power cannot be turned ON accidentally.

c. Disconnect power to equipment if it is out of service.

d. If troubleshooting must be done with the unit energized, have another person present who is trained in turning off the equipment and providing or calling for first aid.

C. FIRE AND EXPLOSION PREVENTION

Fire and explosion are caused by electrical short circuits, combustible material near engine exhaust piping, misuse of batteries and fuel, or unsafe operating or fueling conditions.

1. Electrical Short Circuits and Overloads

Overloaded or shorted equipment can become hot enough to cause fires either by self destruction or causing nearby combustibles to ignite. For electrically-powered equipment, in particular, provide primary input protection to remove short circuited or heavily overloaded equipment from the line.

2. Batteries

Batteries may explode and/or give off flammable hydrogen gas. The acid and arcing from a ruptured battery can cause fires and additional failures. When servicing, do not smoke, cause sparking, or use open flame near the battery.

3. Engine Fuel

Use only approved fuel container or fueling system. Fires and explosions can occur if the fuel tank is not grounded prior to or during fuel transfer. Shut unit DOWN before removing fuel tank cap. Do not completely fill tank, because heat from the equipment may cause fuel expansion overflow. Remove all spilled fuel IMMEDIATELY, including any that penetrates the unit. After clean-up, open equipment doors and blow fumes away with compressed air.

D. TOXIC FUME PREVENTION

Carbon monoxide - Engine exhaust fumes can kill and cause health problems. Pipe or vent the exhaust fumes to a suitable exhaust duct or outdoors. Never locate engine exhausts near intake ducts of air conditioners.

E. BODILY INJURY PREVENTION

Serious injury can result from contact with fans inside some equipment. Shut DOWN such equipment for inspection and routine maintenance. When equipment is in operation use extreme care in doing necessary troubleshooting and adjustment. Do not remove guards while equipment is operating.

F. MEDICAL AND FIRST AID TREATMENT

First aid facilities and a qualified first aid person should be available for each shift for immediate treatment of all injury victims. Electric shock victims should be checked by a physician and taken to a hospital immediately if any abnormal signs are observed.

EMERGENCY FIRST AID

Call physician immediately. Seek additional assistance and use First Aid techniques recommended by American Red Cross until medical help arrives.

IF BREATHING IS DIFFICULT, give oxygen, if available, and have victim lie down. FOR ELECTRICAL SHOCK, turn off power. Remove victim; if not breathing, begin artificial respiration, preferably mouth-to-mouth. If no detectable pulse, begin external heart massage. Call Emergency Rescue Squad immediately.

G. EQUIPMENT PRECAUTIONARY LABELS

Inspect all precautionary labels on the equipment monthly. Order and replace all labels that cannot be easily read.

INTRODUCTION

This manual contains operation and service information for 28.5 V DC Generator sets identified as Jet-Ex 4D. These units are available as stationary, skid-mounted units, or they may be trailer-mounted for portability. Both versions are available with 14 V DC output capability.

Most information in the manual applies to the 28.5 V Jet-Ex 4D in general. Information which applies to options and special equipment is identified as such.

The primary purpose of the manual is to provide information and instructions to experienced operators, electricians, and mechanics who are not familiar with this equipment. The intent of the manual is to guide and assist operators and maintenance personnel in the proper use and care of the equipment.

Read the instructions before starting the unit. Learn to use the manual and to locate information contained in it.

The Table of Contents, which follows this Introduction, lists all Chapters, Sections, and the paragraph titles within each Section. The location of each listing is identified by Chapter, Section and page number. A complete list of illustrations, with their locations, follows the Table of Contents.

Each Chapter is divided into as many Sections as necessary. Sections are always referred to by a combination Chapter/Section number, for example: 2-3 refers to Chapter 2, Section 3.

The material within each Section is divided into main subjects with applicable paragraph headings and subheadings as required. For example, a portion of the Description Section might logically follow this arrangement and paragraphing:

1. Control

    A. Interior Panel

        (1) Protective devices

            (a) Overload relay

        (2) Contactors

Page numbers do not run consecutively throughout the manual. Each page is identifed by the Chapter/Section number in which it appears, and by a page number within the Chapter/Section . Therefore, the first page in each Section is page 1. These identifying numbers appear in the lower, outside corner of each page. Each page also bears a date located in the corner opposite the page number. This date is either that of original issue, or of the latest revision. Any revision to the original text is identified by a heavy black line in the left-hand margin. Illustrations follow a numbering system similar to page numbering. The first Figure in each Section is Figure 1.

All tables, charts and diagrams, as well as illustrations, are identified by Figure numbers to avoid confusion.

The general location of any particular information can be found quickly by running through the Table of Contents. For example: to locate any adjustment information, a quick look at the Table of Contents shows that "Adjustment/ Test" is located in Chapter 2, Section 3, (shown as 2-3).

Portions of the text are referred to by identifying the paragraph in which the referenced material may be found. When referenced material is located in the same Chapter/Section as the reference, only the paragraph identification is given, for example: (Ref. Para. 1, A) means that the material is to be found in paragraph 1, A, of the same Section.

When referenced material is located in another Chapter/Section, both the Chapter and Section numbers and the paragraph identification are given, for example: (Ref. 1-2, Para. 1, A) means that the referenced material is located in Chapter/Section 1-2, and paragraph 1, A within that Chapter/Section.

Components shown in illustrations, and the illustrations themselves, are referenced in a similar manner. When this type of reference is made, the item number of the part and the Figure number in which it appears are given, for example: (2, Fig.3) refer to item number 2 in illustration Figure 3 of the same Chapter/Section.

When a referenced figure appears in another Chapter/Section, the reference will include the Chapter/Section number, for example: (2-3, 1, Fig. 4) tells the user that the information is in Chapter/Section 2-3, and to refer to item 1 in Figure 4.

Once a Figure number reference has been established, the Figure number is not repeated and only the item numbers of the parts involved are referenced, for example: "Loosen screw (2, Fig.6), slide out connector (4), and remove brush (6)."

When an item number is referenced without a Figure number, it always applies to the last preceding Figure number mentioned in the text.

A collection of manufacturer's literature is supplied as part of the information package.

If you have any questions concerning your Hobart Power Systems Division equipment, you are invited to contact our Service Department by mail, telephone, or TWX.

Write:	Hobart Brothers Company Power Systems Division Service Department Troy, Ohio 45373 U.S.A.
Call:	Area code (513) 339-6000 Extension 4276
TWX:	810-456-2907

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ADDENDEM NO. 1

JET-EX 4D OPTIONAL PROTOTYPE TRAILER ASSEMBLY (KIT) 181000

This Addendum along with TO-181 (Chap. 5) covers Kit, Prototype Trailer with Fenders.

Jet-Ex 4D is offered with a choice of two different trailers both of which are optional.

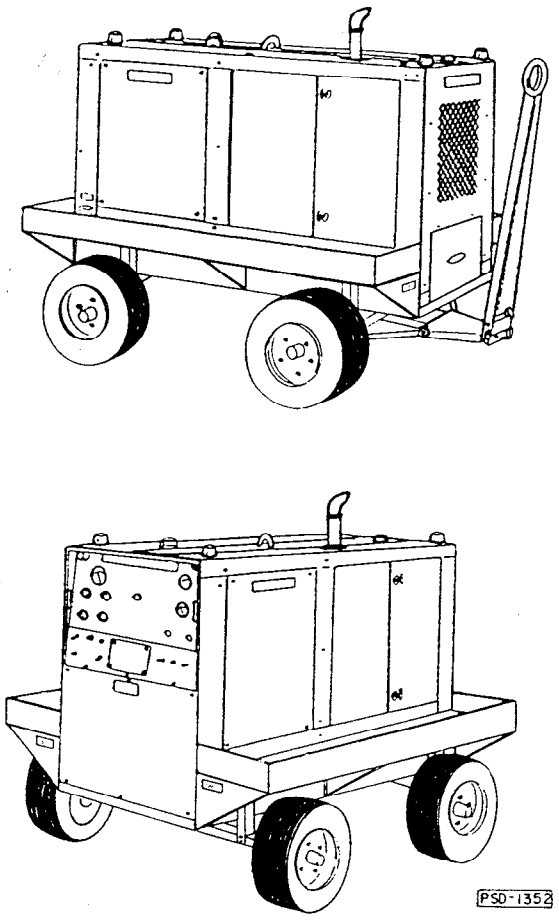
Henschen Trailer With or Without Fenders Part Number 488880.
All References to the Trailer and Fenders in OM-2007 Pertain to the Henschen Trailer.

Prototype Trailer With or Without Fenders Part Number 181000 reference this Addendum and TO-181.

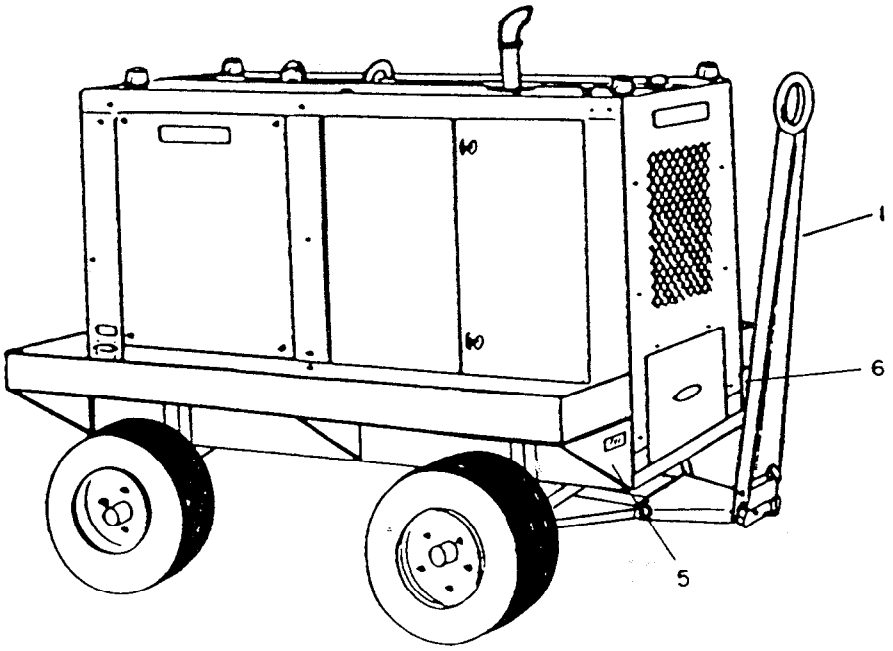
ADDENDUM NO. 1

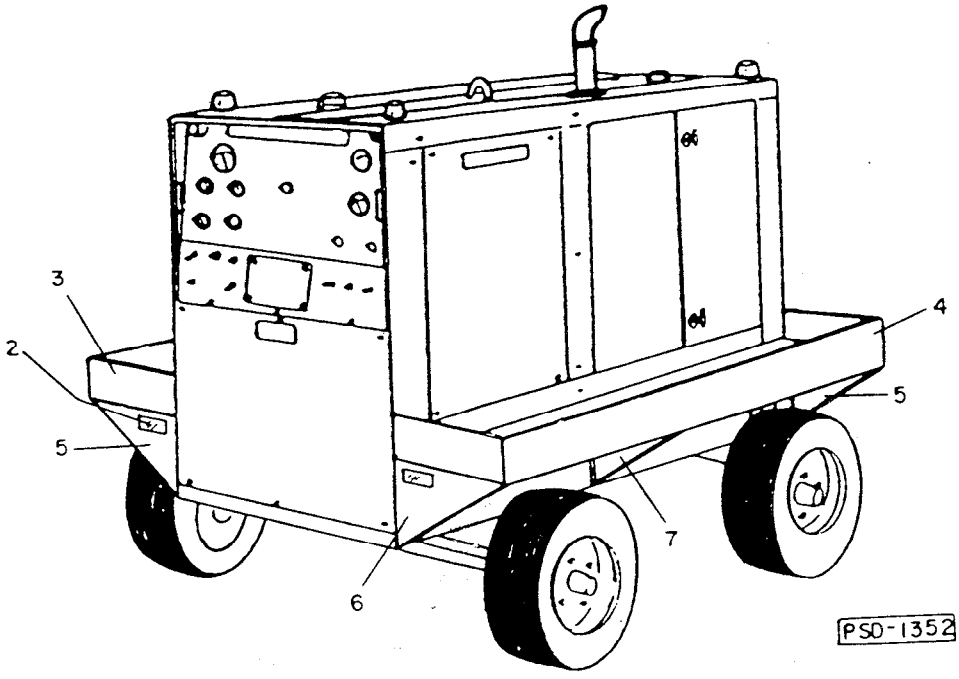
(1) A four-wheel trailer is available to add mobility to the generator set (See TO-181 for Details). It is equipped with a drawbar for towing, and a hand lever actuated parking brake. It also includes fenders that can be used as cable trays. This option is available from Hobart Brothers as Part No. 181000-1.

(2) A four-wheel trailer is available to add mobility to the generator set. It is equipped with a drawbar for towing, and a hand lever actuated parking brake. It also includes cable hangers which are mounted on the right side of the canopy. This option is available from Hobart Brothers as Part No. 181000-2.



Jet-Ex 4D Generator Set With Prototype Trailer
Figure 1



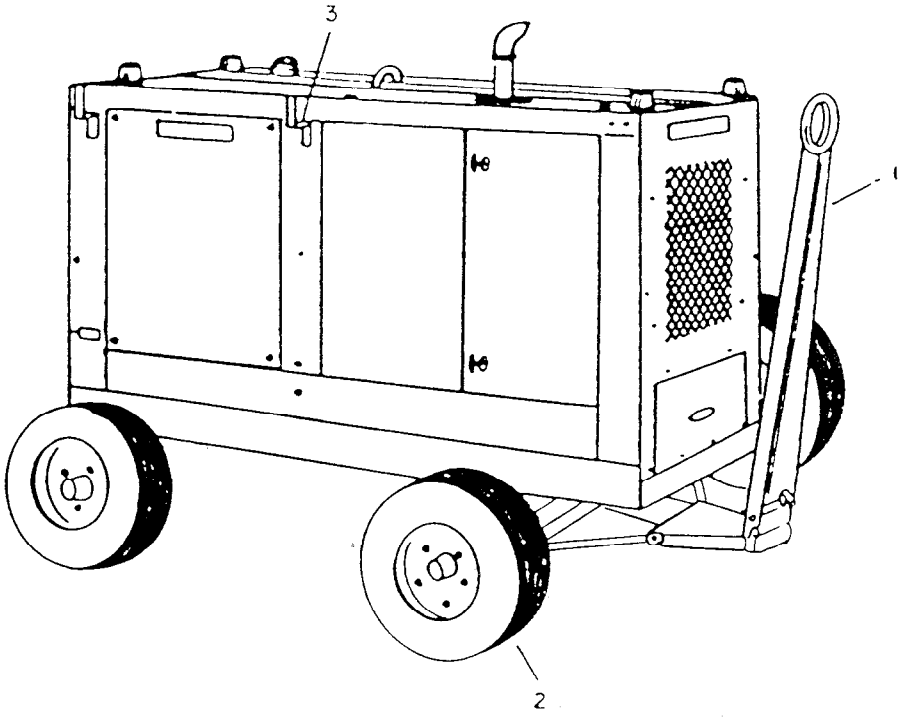


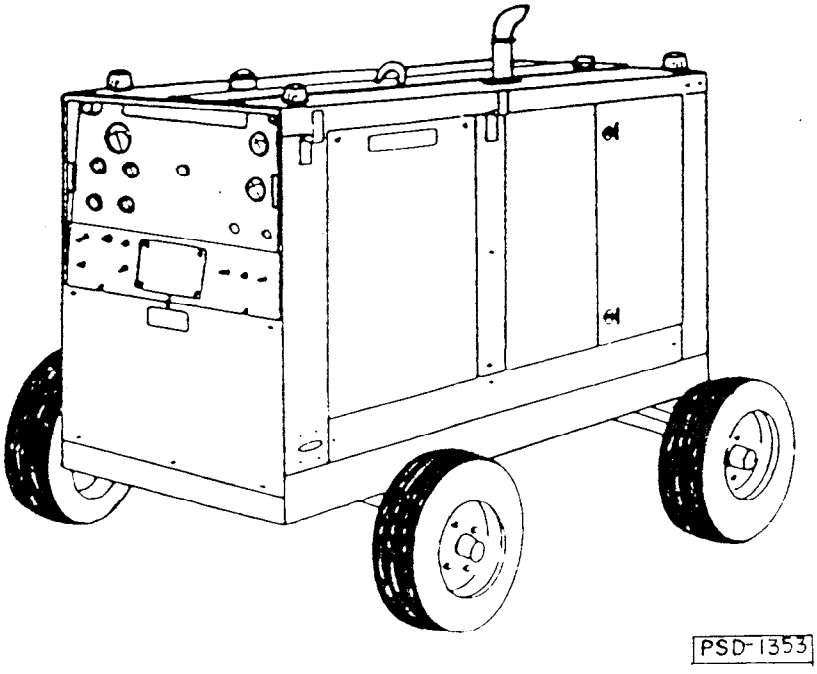
Generator Set
W/Portable Mounting and Fenders (Option)

ADDENDUM NO. 1

NOMENCLATURE

FIGURE ITEM NO.	HOBART PART NO.	1234567	UNITS per ASSY
2-	6854A-1	GENERATOR SET W/ PORTABLE MTG. AND FENDERS (OPTION)	1
1	181000-1	. TRAILER, ASSY, (OPTION) (For Details See TO-181)	1
2	408665-1	. . REFLECTOR, RED	4
3	181006	. . FENDER, LEFT OPTION	1
4	181007	. . FENDER, RIGHT OPTION	1
5	181010	. . BRACKET, MTG. FENDER (RT FRONT & LT REAR) OPTION	2
6	181009	. . BRACKET, MTG. FENDER (LT FRONT & RT REAR) OPTION	2
7	181013	. . BRACKET, MTG. FENDER (RT CENTER) OPTION	1
* 8	181011	. . BRACKET, MTG. FENDER (LT CENTER) OPTION	1
9	181008	. . SUPPORT, FENDER REAR OPTION	2
10	181012	. . SUPPORT, FENDER FRONT OPTION	2





Generator Set W/Portable Mounting (Option)
Figure 3

ADDENDUM NO. 1

NOMENCLATURE

FIGURE ITEM NO.	HOBART PART NO.	1234567	UNITS per ASSY
3-	6854A-1	GENERATOR SET JET-EX 4D WITH PORTABLE MTG. (OPTION)	1
1	181000-2	. TRAILER ASSY., (OPTION) (For Details See TO-181)	1
2	85B-1013	. . TIRE, 5:30 X 12, WHEEL ASSY.	4
3	DWP-982	. . BRACKET, CABLE	2

* Not Illustrated

CHAPTER 1. DESCRIPTION/OPERATION

SECTION 1. DESCRIPTION

1. General

The Jet-Ex 4D unit covered in this manual (Figure 1) is a diesel engine driven, self-contained generator set manufactured by Hobart Brothers Company, Power Systems Division, Troy, Ohio U.S.A. The basic unit is identified by a Series Number - either 6854 or 6854A - plus a dash number which defines a specific configuration. The Series number, plus the dash number, make up the Specification Number.

Specification No. 6854-1 - or Specification No. 6854A-1 - covers a stationary, skid mounted unit rated at 28.5 Volts DC output. It is equipped with a sheet metal canopy and hinged engine compartment door. Various options are available for use with the basic unit. These options are listed in paragraph 2.B. below.

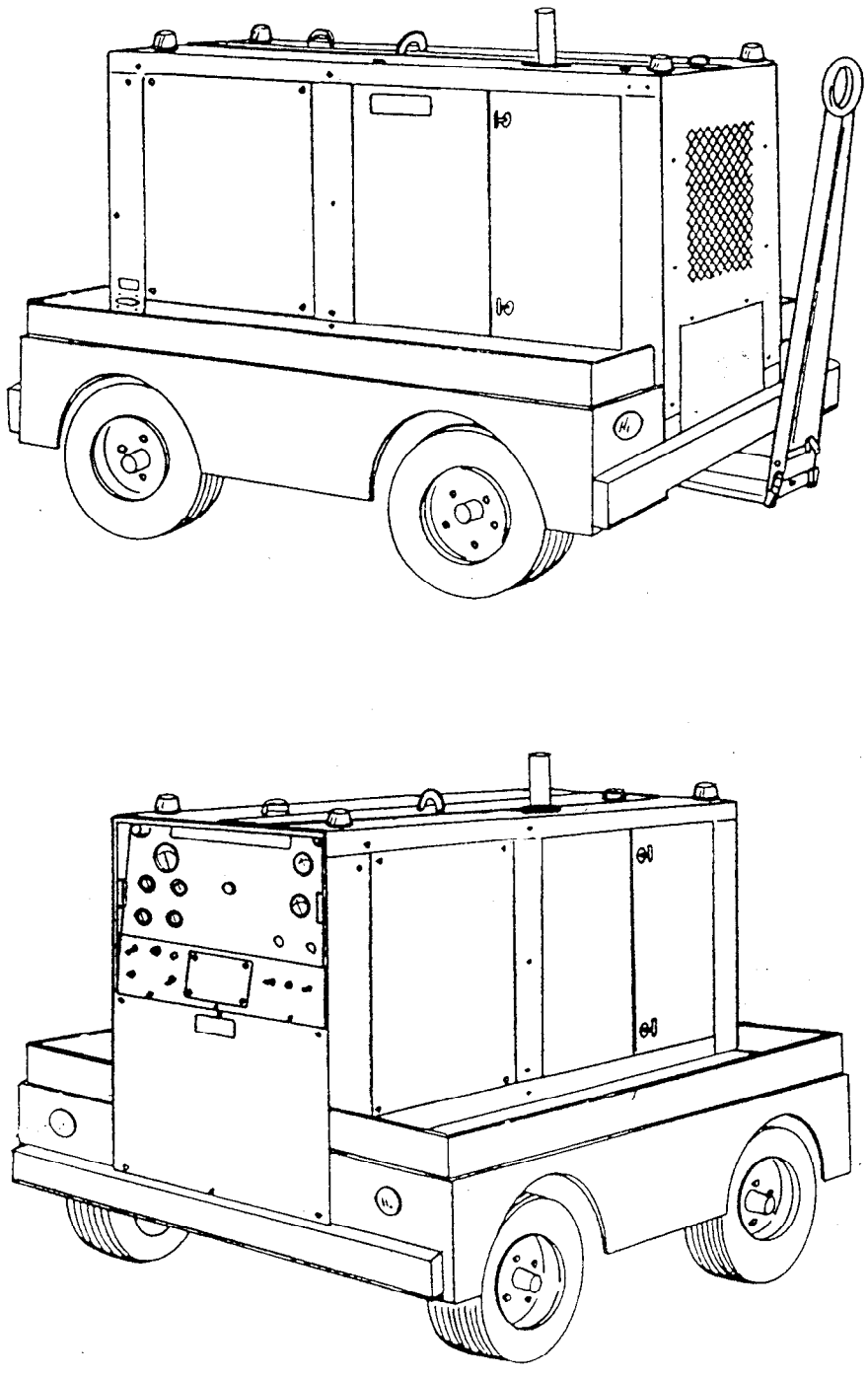
The generator sets in Series 6854A are identical in appearance, construction, and electrical operation to Series 6854 generator sets. They differ from Series 6854 generator sets in that, in Series 6854A units, the tachometer sending device is eliminated, a different tachometer is used, and a different brand of alternator is used.

The basic generator set is designed to generate and deliver 28.5 volts DC power to an aircraft when its on-board generators are shut down. In addition to poviding continuous, regulated power to the aircraft, the unit is designed for starting any fixed-wing aircraft or helicopter which is equipped with an external 28.5 volt DC power receptacle. Refer to Figure 2 for complete Specifications and Capabilities.

2. Special Features

A. Standard

The "Soft-Start" current limiting feature, recommended by most engine manufacturers, provides the operator with a control which limits the inrush current to the aircraft engine's starter. When the operator presets this control, the generator will provide constant voltage to the preset currrent value. As more current is applied beyond the preset current value, the voltage will decrease to a minimum of 14 volts DC, after which the voltage will remain constant as more current may be delivered beyond the preset current value. Limiting inrush current is recommended by most engine manufacturers to protect the aircraft engine's starter shear section. The current limiting control is continuously adjustable from 300 amperes, which is recommended for helicopter and small turbine starting, to 2000 amperes, required for starting larger aircraft engines when the control is turned fully clockwise.



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Jet-Ex 4D Generator Set
Figure 1

UNIT WITH CABLE HANGERS & SPACERS UNDER FRAME

Length	65.75 inches (1670 mm)
Width	34.25 inches (870 mm)
Height	53 inches (1346 mm)
Weight (dry fuel tank)	1900 pounds (862 kg)

UNIT WITH TRAILER AND CABLE HANGERS (Without Fenders)

Length	78.75 inches (2000 mm)
Width	54.5 inches (1384 mm)
Height	57.5 inches (1461 mm)
Weight (dry fuel tank)	2125 pounds (964 kg)
Ground Clearance	3.625 inches (92 mm)

UNIT WITH TRAILER, FENDERS AND CABLE TRAY

Length	79.75 inches (2026 mm)
Width	56 inches (1422 mm)
Height	57.5 inches (1461 mm)
Weight (dry fuel tank)	2280 pounds (1034 kg)
Ground Clearance	3.625 inches (92 mm)

GENERATOR

Output Power Rating	15.7 kW
Voltage	28.5 volts DC
Rated Load Capacity	550 amperes continuous at 28.5 volts DC
Starting Current Capacity	2000 amperes maximum
Current Limiting Capability	300 to 2000 amperes, continuously adjustable
Operating Speed	2600 RPM

ENGINE

Manufacturer	Perkins Diesel
Model	4.236
Type	4-cylinder, 4-stroke, direct injection
Fuel	ASTM D975 66T Numbers 1D or 2D
Displacement	236 cubic inches (3.86 liters)
Rated Power at 2400 RPM	77 Horsepower
Oil Capacity (with filter change)	8 quarts (7.57 liters)
Coolant Capacity	3.5 U.S. gallons (13.25 liters)

Specifications and Capabilities
Figure 2 (Sheet 1 of 2)

Electrical System	12 volt DC, negative ground
Governed Speed at No Load	2600 + 50 RPM
Idle Speed	1000 + 50 RPM
Fuel Tank Capacity	21.5 U.S. gallons (81.4 liters)

PROTECTIVE DEVICES

GENERATOR

28.5 volt overvoltage module trips at 32 to 34 volts.
14 volt overvoltage module trips at 18 to 20 volts.

ENGINE

Water Temperature Switch opens engine circuit at 225°F.
Low oil pressure switch opens at 20 PSI (138 kPa).

Specifications and Capabilities
Figure 2 (Sheet 2 of 2)

B. Options

(1) A four-wheel torsional spring trailer is available to add mobility to the generator set. It is equipped with pneumatic rubber tires, a drawbar for towing, and drawbar-operated, drum type parking brake. It also includes fenders, bumpers and cable trays. This option is available from Hobart Brothers as Part No. 488880-3.

(2) A four-wheel torsional spring trailer is available to add mobility to the generator set. It is equipped with pneumatic rubber tires, a drawbar for towing, and drawbar-operated, drum type parking brake. It also includes cable hangers which are mounted on the right side of the canopy. This option is available from Hobart Brothers as Part No. 488880-4.

(3) For mounting the generator set as a stationary unit, a stationary mounting kit is available. This kit, identified as part number 489689, consists of four spacer brackets which support the unit and permit anchoring it to a floor or platform, screws for fastening the spacer brackets to the unit, and two cable hanger brackets.

3. Orientation

The radiator end of the Jet-Ex 4D is the front. Right and left are determined by standing at the rear of the unit, facing it. The control panel is located at the rear.

4. Identification

The Jet-Ex 4D unit is identified by Specification numbers as described in paragraph 1, above. There may be any number of generator sets with the same Specification number. Individual machines are identified by a Serial number, assigned to one machine only.

Each generator set has an Identification plate attached inside the hinged control panel door. This nameplate lists the machines's Model No. (Jet-Ex 4D), Specification No., Serial No., and electrical rating.

If any of the options described in paragraph 2. B. are included, they will be listed by name and part number on a separate option nameplate located next to the Identification plate.

5. Canopy

The standard canopy is a sheet metal enclosure which protects the engine, generator, and electrical controls. It has two hinged doors on each side at the front to provide access for service and maintenance. Panels at the rear provide access to the generator. A Plexiglas window is mounted above the control panel to allow observation of the instruments while protecting them from the weather. The left rear panel has a round hole in it to permit viewing the fuel gage mounted in the fuel tank.

6. Engine, Generator, and Controls

A. General

Refer to Figure 3. The engine (4) and generator (9) are mounted on a welded steel frame (20). A fuel tank support (21) located at the rear of the unit supports the fuel tank (7) and provides a mounting frame for the load contactor (14) and output terminals. The radiator (1) is mounted to the front canopy. A heavy U-bolt is attached to the centrally located lifting yoke (5) for moving the generator set with a crane or hoist.

B. Engine

(1) General

The engine used in the Jet-Ex 4D generator set is a Perkins four-cylinder, four-stroke, direct injection diesel engine. It has a 236 cubic inch (3.86 liter) cylinder displacement and a 16:1 compression ratio. Engine firing order is 1-3-4-2.

A spring-loaded relief valve in the pump limits maximum pressure in the system. A full-flow oil filter (12, Figure 3) cleans the entire output of the pump before it enters the oil distributing system. A valve in the filter provides a bypass to an oil gallery in case the filter becomes clogged. A low oil pressure switch is mounted on the engine block as a protective device. The primary ignition circuit is wired through the contacts of this switch, which closes at 20 PSI (138 kPa). This prevents the engine from running if oil pressure will not build up, and also shuts down the engine if oil pressure drops radically during operation.

See Figure 2 and the engine operator's manual for engine specifications.

The generator and engine are mounted on a welded steel skid, and are enclosed by a sheet metal canopy that bolts to the skid. Access to engine serviceable components (oil filter, air cleaner, and rectifier assembly, etc.) is through two doors at the front on each side of the machine.

Two removeable panels to the right side and one to the left rear allow access to the other components such as the load contactor and output terminals. The rear panel is removeable and permits access to the rectifier assembly.

(2) Cooling fan

The cooling fan on the engine is designed to blow air out through the radiator rather than to draw it in. This prevents hot air, heated by the engine, from entering the generator.

(3) Fuel system

The fuel system consists of an 21.5-gallon (81.4 liters) tank (7, Figure 3) with all the necessary fittings and hoses.

(4) Alternator and regulator

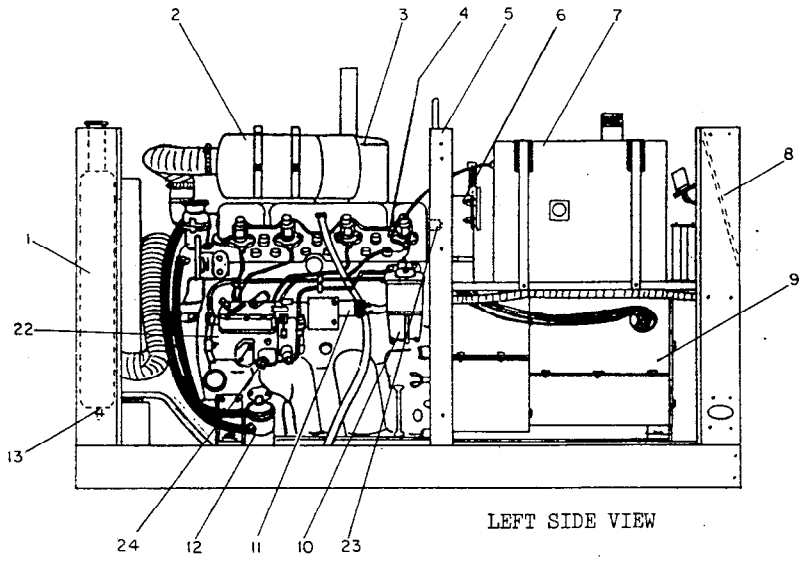
The battery charging alternator (16, Figure 3) is rated at 42 amperes on Series 6854 generator sets and at 62 amperes on Series 6854A generator sets. The voltage regulator is an integral part of each of these alternators.

(5) Starter relay

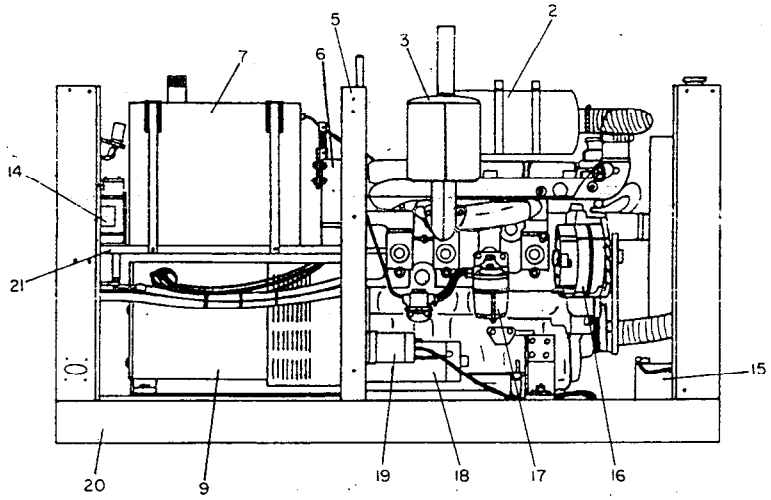
The starter relay (19, Figure 3) is mounted on the starter motor (18), on the right side of the engine.

(6) Exhaust muffler (3, Figure 3)

This muffler helps deaden audible noise from the engine's exhaust.



LEFT SIDE VIEW



RIGHT SIDE VIEW

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1. Radiator
2. Air cleaner
3. Muffler
4. Engine
5. Lifting yoke
6. Rectifier assembly
7. Fuel tank
8. Control panel
9. Generator
10. Fuel filter
11. Throttle control solenoid
12. Oil filter
13. Drain cock
14. Load contactor
14. Load contactor
15. Batteries
16. Alternator
17. Fuel filter
18. Starter
19. Starter relay
20. Frame
21. Fuel tank support
22. Engine governor
23. Water temperature sender & switch
24. Oil pressure sender & switch

Generator Set Components
Figure 3

C. Generator

The generator (9, Figure 3) is a multi-phase, synchronous salient pole, revolving field, AC generator whose output is rectified. The output is rectified by a rectifier assembly (6) made up of twelve rectifiers connected into a full wave configuration. The generator is self-excited and receives excitation from a three phase full wave rectified stator winding. One positive and one negative brush in contact with slip rings supply controlled excitation current from the stator winding through the voltage regulator to the rotating field winding. The voltage regulator controls the excitation current and maintains a constant output voltage. Access to the brushes is through holes in the anti-drive end bracket. The rotor is supported at the anti-drive end (slip ring end) by a single-row ball bearing. The drive end is connected to the engine fly-wheel by a flexible disc and hub coupling assembly and is supported by the engine main bearings. A radial-blade fan of formed and welded sheet metal construction is mounted on the coupling hub and draws cooling air over the generator windings.

Air enters through the anti-drive end of the generator and is discharged through openings in the flywheel housing at the drive end, to cool the rectifier assembly above it. The generator housing assembly, which contains the generator stator, is bolted to the engine flywheel housing.

D. Control Panel Assembly (Figure 4)

(1) General

The hinged control panel (8, Figure 3) houses and provides mounting facilities for controls, monitoring instruments, voltage regulator, relays, etc. The panel is mounted at the rear of the canopy. Its control are accessible behind a hinged Plexiglas cover.

(2) Lights

Two panel lights (7, Figure 4) provide illumination for instruments and controls. One green pilot light (12) glows when the output load contactor is closed, and another one (14) glows green when the engine is running.

(3) Monitoring instruments

The voltmeter (6, Figure 4) indicates generator output voltage, and the ammeter (5) displays generator current.

A tachometer (2) displays the engine speed in RPM. On Series 6854 units this instrument is operated by tachometer sender mounted on the engine governor (22, Figure 3). On Series 6854A units, there is no sender, and the tachometer receives its operating signal from the alternator.

A water temperature gauge (3) indicates the engine coolant temperature and is actuated by a temperature sender (23, Figure 3) mounted on the engine's water jacket.

An oil pressure gauge (1, Figure 4) displays the pressure in the engine's lubrication system. It is operated by a sender (24, Figure 3) mounted on the engine block.

The ammeter (20, Figure 4) indicates the rate of charge or discharge in the engine's 12 volt DC electrical system.

The hourmeter (15) records the total hours of engine operation for scheduling maintenance.

(4) Potentiometer

The current limiting potentiometer (4) is used to select the starting current recommended for various aircraft. The current limiting setting is continuously adjustable from 300 to 2000 amperes.

(5) Switches

The contactor control switch (11, Figure 4) is a three-position toggle switch used to close and open the output load contactor. The top CLOSE position is spring-loaded and is held momentarily until the contactor closed light (12) glows, then it is released to the center ON position. In this position the switch provides holding current to the load contactor to keep it closed. Protective devices in the load contactor circuit provide protection against overvoltage by opening the load contactor if that condition occurs. In the bottom OFF position, the contactor is opened. The push-to-build-up-voltage switch (10) is a momentary contact pushbutton switch which flashes the generator fields with 12 volt engine circuit when flashing the fields.

The panel lights switch (8, Figure 4) turns the lights (7) on and off. The engine start switch (17) is a momentary contact pushbutton which closes the starter relay (8, Figure 3) and cranks the engine. This switch is operable only when the engine switch (19) is held in its top spring-loaded START position.

The engine switch (19), when released from its top START position after the engine starts, will return to center RUN position. The engine ON light (14) will glow as long as the switch is in RUN position. In the bottom STOP position, the switch will stop the engine and the light (14) will go out.

Refer to Figure 4. The speed control switch, (13) is a two-position toggle switch wired to an idling device on the engine. In the IDLE position, used for starting, the engine speed is controlled approximately. In the Rated RPM position, engine speed is controlled to approximately 2600 RPM.

(6) Fuses

Three cartridge-type fuses protect the engine ignition circuit, the panel lights circuit, and the voltage regulator. The engine circuit fuse (13, Figure 4) is rated at 20 amperes, the panel lights fuse (9) at 10 amperes, and the voltage regulator fuse (4, Fig. 5) at 10 amperes.

(7) Voltage regulator

Refer to Figure 5. The voltage regulator (1) is a solid-state device which regulates the 28.5 volt DC generator output after the voltage is built up.

(8) Overvoltage module

The overvoltage relay (2) is a solid-state protective device on a printed circuit board. A normally closed relay in the circuit is wired into the load contactor coil circuit. An overvoltage condition causes the relay contacts to open, which in turn prevents the contactor from closing, or opens the load contactor and discontinues the power delivery. The overvoltage module is adjusted to to trip at 32 to 34 volts DC in 2 to 10 seconds.

(9) Resistor and diode assembly

This network, which is mounted on a terminal strip behind the control panel, protects the load contactor hold circuit against excessive current draw when the generator is delivering power.

(10) Excitation rectifiers

Two diode bridge rectifiers, CR418 and CR418, (3, Fig. 5) convert an AC voltage from the generator armature to the DC voltage needed for the generator revolving field.

(11) Voltage sensing relay

Voltage sensing relay K406 (5, Fig. 5) is a safety device which automatically opens the grounding circuit of the revolving field to prevent excessive voltage build-up if the push-to-build-up-voltage switch is held in too long, or if it is pushed in after voltage is built up.

E. Contactor

The load contactor, which is mounted behind the control panel on the fuel tank support, provides a safe and convenient means of connecting and disconnecting the generator from the load. Initial power for closing the load contactor is supplied by the generator through the spring-loaded momentary contacts of the contactor control switch (11, Figure 4). Holding power, to keep the contactor closed, passes through the normally open auxiliary contacts in the load contactor.

F. Output Terminals

The output terminal panel is mounted inside the unit just behind the control panel. The positive terminal is the A2 terminal of the load contactor, and the negative terminal is to the right of the load contactor.

G. Rectifier Assembly

The rectifier assembly (6, Figure 3) is located at the center of the machine on the fuel tank support. It consists of two aluminum heat sinks with twelve diodes on each heat sink. The negative heat sink assembly is mounted nearest to the fuel tank, and the positive heat sink assembly is mounted nearest to the engine. The rectifier assembly converts the AC output of the generator to 28.5 V DC.

H. Ammeter Shunt

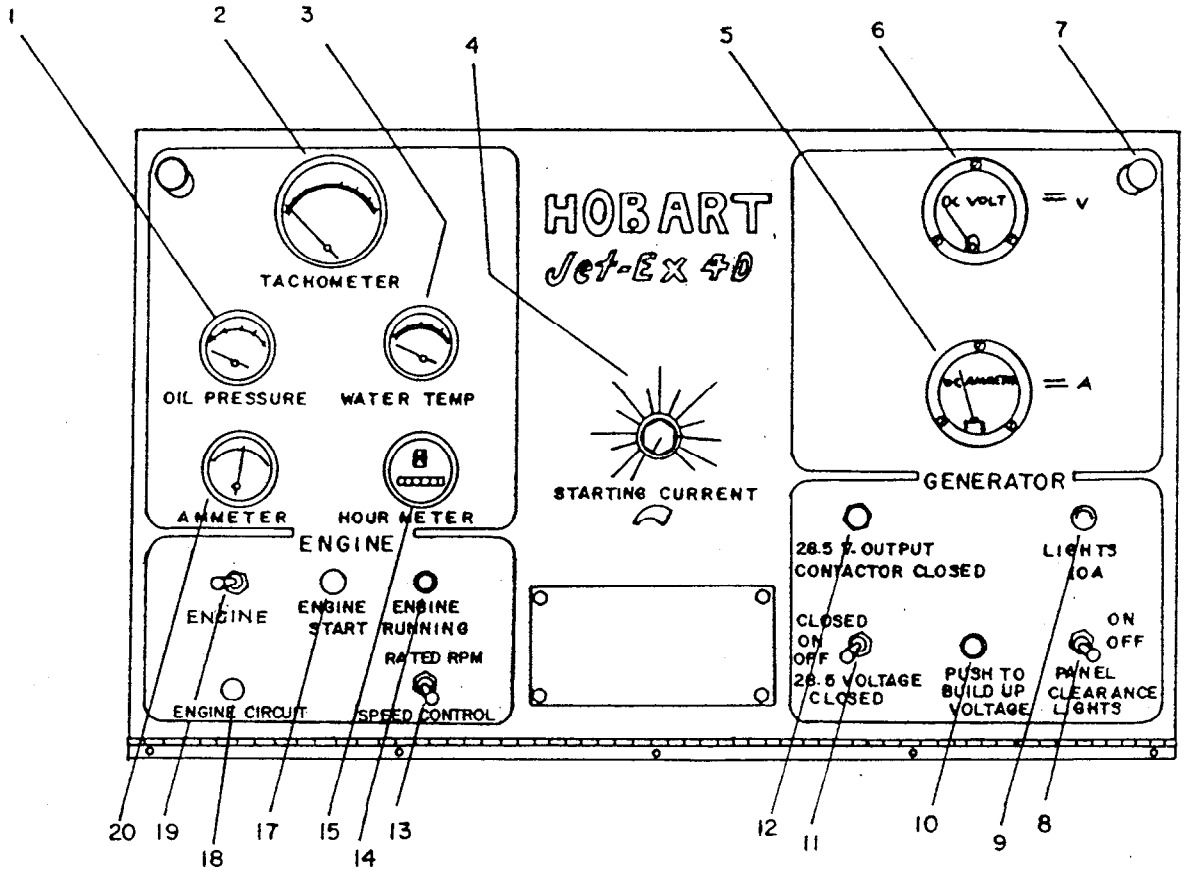
The ammeter shunt is connected in the generator's negative output circuit. It supplies a small voltage proportional to output current for operation of the generator ammeter (5, Fig. 4) and for sensing output current for the current limit circuit of the voltage regulator (1, Fig. 5). This shunt is mounted on the negative heat sink of the rectifier assembly (6, Fig. 3).

7. Optional Equipment

A. Trailer

The portable Jet-Ex 4D is mounted on an optional four-wheel trailer (see Figure 1) which consist of front and rear axle assemblies. The axles are mounted directly to the main frame of the generator set. It is available with or without the fenders, bumpers and cable trays. The front axle is a solid beam type. Front wheels are mounted on spindles which are operated by tie rods connected to the hitch and drawbar assembly. The spindles are mounted to the axle by means of torsional springs.

Any side-to-side movement of the drawbar turns the wheels in the direction of travel. The drawbar can be folded upward and locked in the vertical position when the trailer is parked. When the drawbar is raised, it applies the brakes on the rear wheels.



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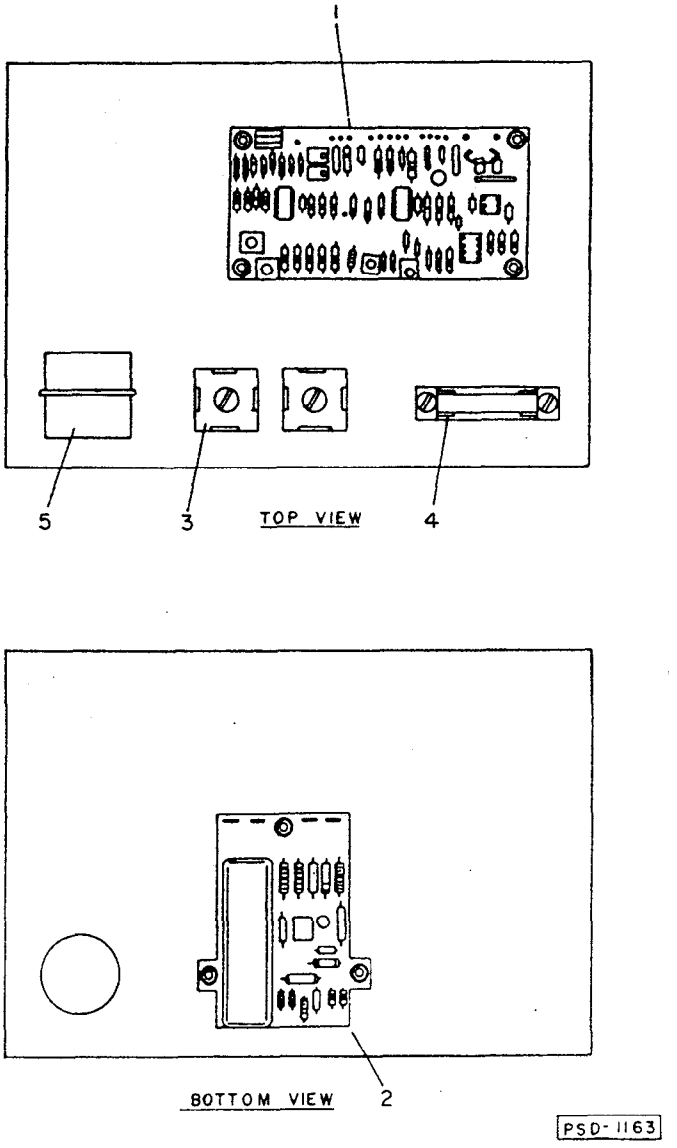
1. Oil Pressure Gauge
2. Tachometer
3. Water Temperature Gauge
4. Current Limit Control
5. Ammeter (Generator)
6. Voltmeter
7. Panel Light
8. Panel Lights Switch
9. Panel Lights Fuse
10. Push-To-Build-Up-Voltage Switch
11. Contactor Control Switch
12. Contactor Closed Light
13. Speed Control Switch
14. Engine On Light
15. Hourmeter
16. (deleted)
17. Engine Start Switch
18. Engine Circuit Fuse
19. Engine Circuit Switch
20. Ammeter (Engine)

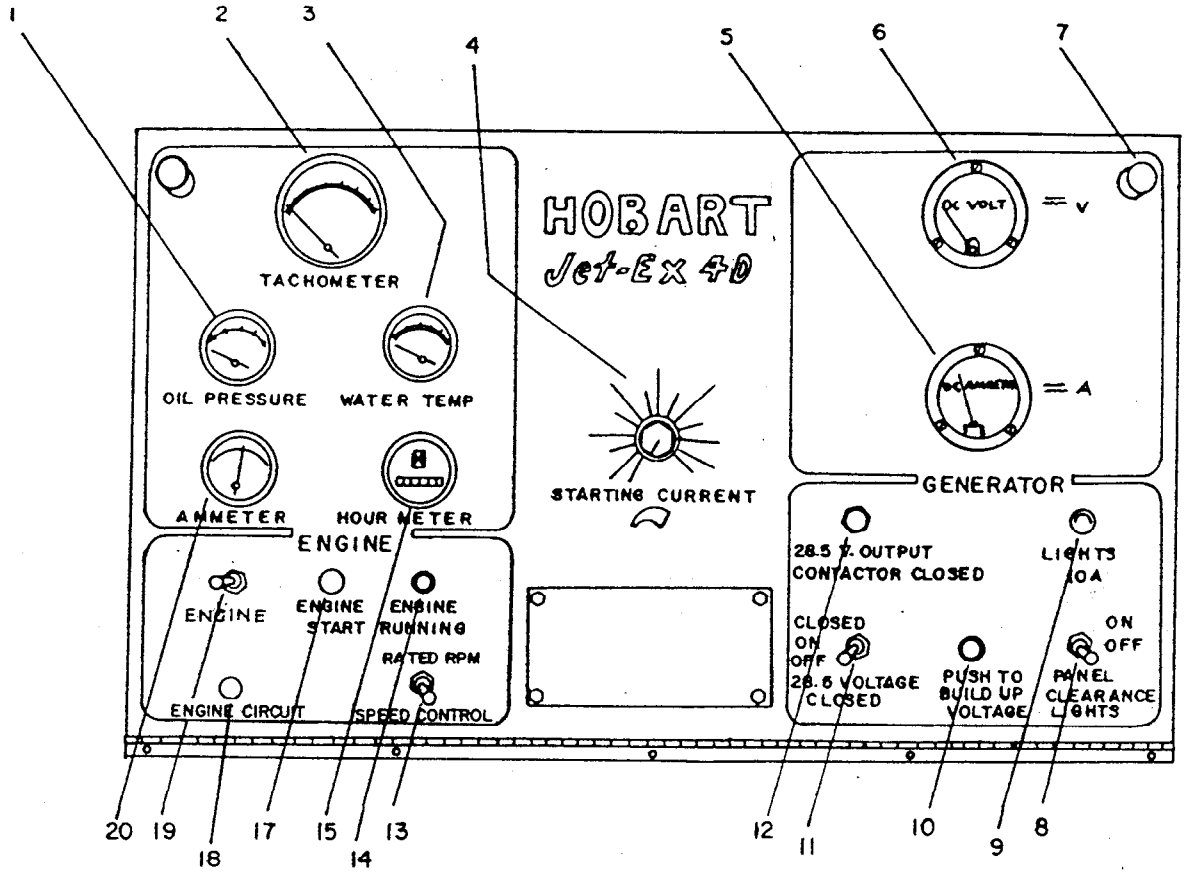
Control Panel Assembly
(W/Shelf On Rear)
Figure 4

The rear axle is also a solid beam type. The rear wheels are mounted to the axle by means of torsional springs and they have drum-type brakes.



1. Voltage Regulator
2. Overvoltage Relay
3. Excitation Rectifiers
4. Vo¶tage Regulator Fuse
5. Voltage Sensing Relay

Voltage Regulator Support
(W/Shelf On Rear)
Figure 5



1. Oil Pressure Gauge
2. Tachometer
3. Water Temperature Gauge
4. Current Limit Control
5. Ammeter (Generator)
6. Voltmeter
7. Panel Light
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9. Panel Lights Fuse
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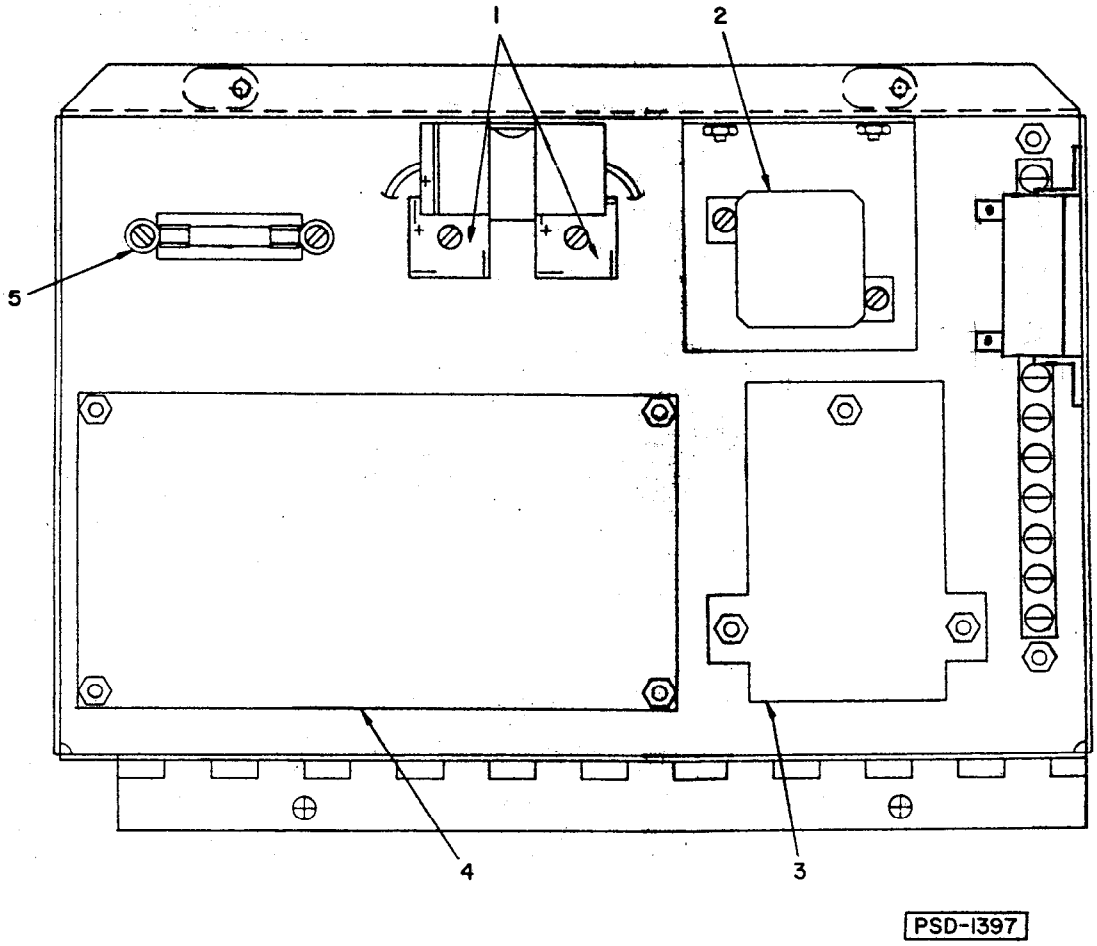
12. Contactor Closed Light
13. Speed Control Switch
14. Engine On Light
15. Hourmeter
16. (deleted)
17. Engine Start Switch
18. Engine Circuit Fuse
19. Engine Circuit Switch
20. Ammeter (Engine)

Control Panel Assembly
(W/Enclosure On Rear)
Figure 6



1. Excitation Rectifiers
2. Voltage Sensing Relay
3. Overvoltage Relay
4. Voltage Regulator
5. Voltage Regulator Fuse

Voltage Regulator Support
(W/Enclosure On Rear)
Figure 7

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SECTION 2. PREPARATION FOR USE, STORAGE, OR SHIPPING

1. Preparation for Use

A. General

The generator set is shipped with dry batteries and an empty fuel tank. After the batteries are filled with electrolyte and charged, the fuel tank filled and the generator set inspected, the generator set is ready for use.

CAUTION: READ OPERATING INSTRUCTIONS IN SECTION 1-3 BEFORE OPERATING THE UNIT.

B. Inspection/Check

Inspect the unit completely prior to operation.

(1) Remove crating, blocking, banding, ties, and other securing and protective material. After shipping carton is removed, remove the four carton supports from the bases of the clearance lights. Then install the attached clearance light lenses in their bases.

(2) Inspect exterior for shipping damage such as broken glass, damaged sheet metal, etc.

(3) Open canopy door and inspect interior for foreign material such as rags, tools, shipping papers, etc.

(4) Check fuel, coolant, and oil hoses and connections for visible leaks. If leaks are discovered, correct by tightening hose clamps, tube fittings, etc., as required.

(5) Check security of attaching and retaining hardware.

(6) Check the following for sufficient quantity.

(a) Fuel

Fuel tank capacity is 21.5 gallons (81.4 liters). Use

(b) Engine coolant

The radiator cap is located above the front canopy. Coolant level should be approximately one inch below the filler neck. Allow a sufficient capacity for coolant expansion.

CAUTION: BE SURE THE COOLING SYSTEM ANTIFREEZE SOLUTION IS ADEQUATE TO PROTECT BELOW LOWEST TEMPERATURE EXPECTED.

(c) Engine lubricating oil

The oil level dipstick is located on the right side of the engine. Refer to Perkins User's Handbook for oil recommendations.

(7) Make sure air cleaner element is installed. Recommended replacement element is Donaldson Duralite Element No. P10-1222 (Hobart Part No. 408436)

(8) Check fluid level in 12 volt batteries. Fluid should cover plates.

C. Output Cable Installation

Units are normally supplied without a generator-to-aircraft cable.

(1) Cable requirements

Cable length is determined by the customer's requirements. It is recommended that the cable be no longer than 30 feet (9 m). The cable should be two conductor with lug-type terminals on one end and an AN-2551 plug connector on the other.

The recommended single conductor sizes for 28.5 volt DC, continuous rated amperage and 90°C (194°F) rise is as follows: for 285 amperes use 2/0 size
for 385 amperes use 4/0 size
for 530 amperes use 350 MCM size

NOTE: Some operators may wish to add a second cable assembly with MS-25019 plug connector for starting aircraft such as Jetstar and Sabre liner.

(2) Cable connector

(a) Connect 28 volt conductors to output terminals on output terminal panel (Figure 1). Connect POSITIVE cables to output (lower) terminals of load contactor. Connect NEGATIVE cables to vertically-mounted bus bar.

(b) Store cables in cable tray provided on top of fender, or on hangers on side of canopy if fenders are not used.

2. Preparation for Storage

When a generator set is to be stored or removed from operation, special precautions should be taken to protect the internal and external parts from rust and corrosion.

A. General

(1) The unit should be prepared for storage as soon as possible after being removed from service.

(2) Storage should be in a building which is dry and which may be heated during winter months.

(3) Moisture absorbing chemicals are available for use where excessive dampness is a problem, however the unit must be completely packaged and sealed if moisture absorbing chemicals are to be effective.

B. Temporary Storage

When storing the unit for one month, prepare as follows:

(1) Lubricate the unit completely in accordance with instructions in Section 2-2. This will include changing engine oil, and filter elements.

(2) Make certain the cooling system antifreeze solution is adequate to protect below the lowest temperatures expected during the storage period.

(3) Clean the exterior of the engine with fuel oil and dry with clean cloths and compressed air.

(4) Seal all engine openings. Use a waterproof, vaporproof material which is strong enough to resist puncture damage from air pressure.

C. Long Time Storage

(1) Engine Protection

The Jet-Ex 4D generator set may be stored for long periods if the engine is given proper protection from rust and corrosion. Refer to the Perkins Diesel Users Handbook (Series 4.236) for proper procedures to be followed.

(2) Generator Protection

To protect the generator and other electrical components, the complete unit should be packaged, using moisture proof packaging and sealing materials. Place packages of moisture absorbing chemicals, such as silica-gel, in the unit before packaging.

WARNING: PLACE WARNING TAGS IN SEVERAL PLACES TO MAKE CERTAIN THAT THE INDIVIDUAL WHO TAKES THE UNIT OUT OF STORAGE IS WARNED THAT ENGINE OIL AND COOLANT HAVE BEEN DRAINED.

(3) Battery Care

Remove batteries and store in a cool dry place. Store the batteries on wood rather than directly on cement or metal.

3. Preparation for Shipping

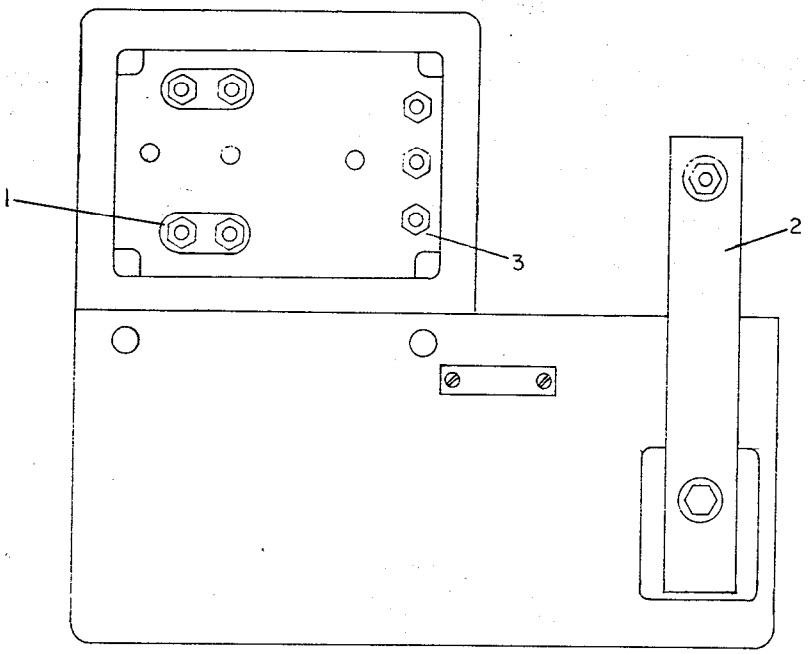
Prepare the unit for shipping as follows:

A. Seal all engine openings to prevent the entrance of water, dirt, and dust.

B. Disconnect battery cables.

C. Drain all fuel from tank and fuel lines as required by carrier rules.

D. Crate the unit solidly to prevent damage to instruments, glass, and sheet metal.

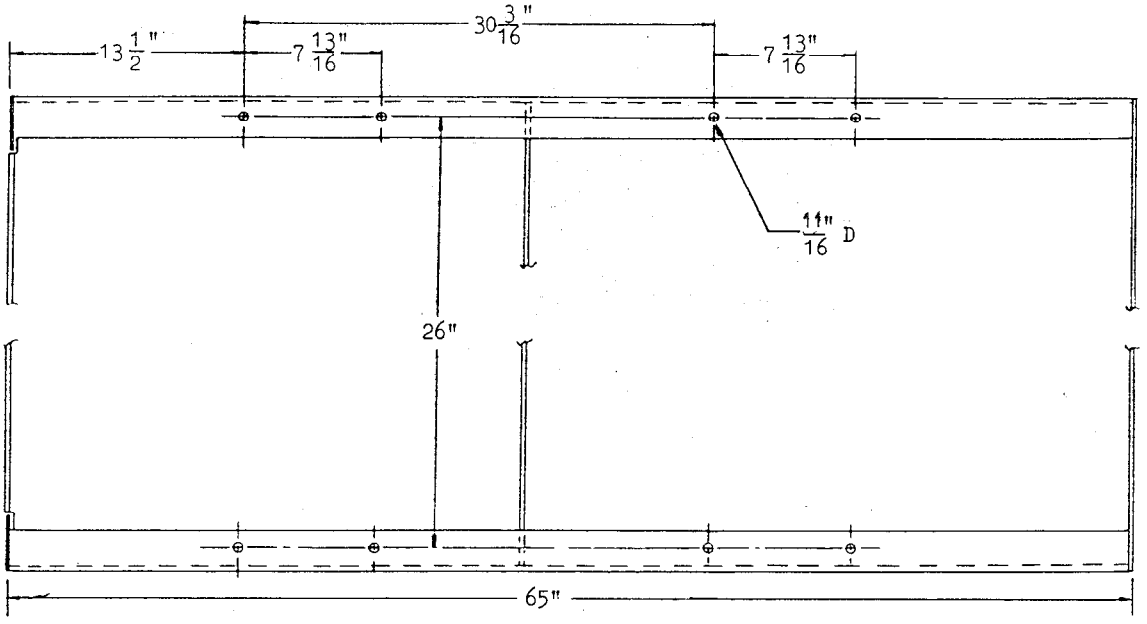


1. Positive Output Connection
2. Negative Output Bus Bar
3. Load Contactor

28 Volt Output Terminal Panel
Figure 1

4. Stationary Unit Mounting

Figure 2 illustrates the mounting hole pattern in the base of the stationary Jet-Ex 4D generator set. Each of the eight holes is 11/16" (17.5 mm) in diameter.



Stationary Unit Mounting Holes
Figure 2

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SECTION 3. OPERATION

1. General

This section contains information and instructions for the safe and efficient operation of the generator set. Operating instructions are presented in a step-by-step sequence of procedures to be followed in supplying power to an aircraft.

NOTE: Read ALL of the operating instructions before attempting to operate the equipment.

WARNING: EAR PROTECTION MAY BE NECESSARY WHEN WORKING CLOSE TO THIS EQUIPMENT.

2. Operating the Generator Set

A. Pre-start Inspection

(1) Always be sure there is sufficient oil and coolant in the engine.

(2) Be sure the fuel shutoff valve is open. The valve is located at the fuel tank outlet. Observe the fuel gage. Make certain of sufficient fuel to complete the job to be done.

(3) If the unit is trailer mounted and is not connected to a tow vehicle, be sure the parking brake is applied and that the drawbar is raised and locked in the vertical position. Raising the drawbar to the vertical position automatically applies the brakes, and they will be released when the drawbar is lowered.

(4) Open the engine compartment doors and inspect interior for rags, tools, and foreign material.

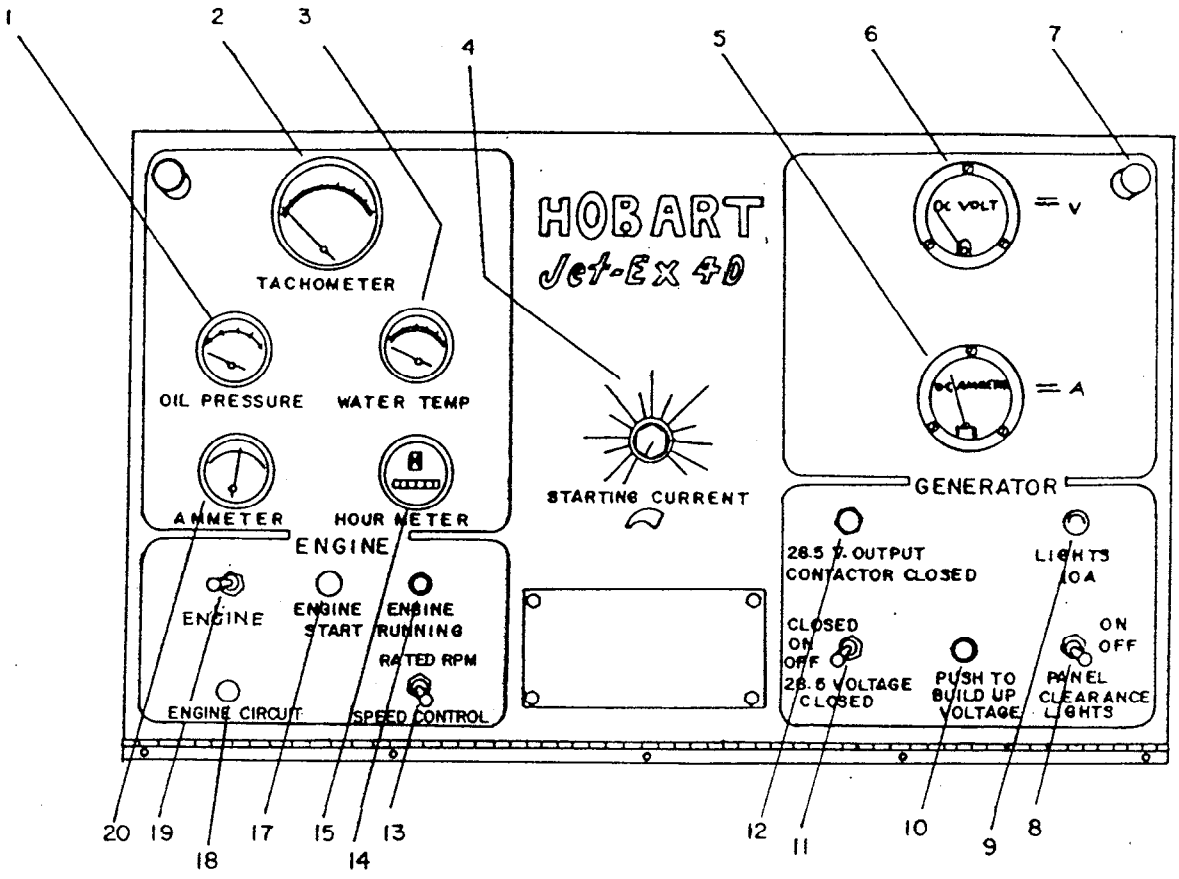
B. Pre-start Instructions

In all probability, the unit will be moved from one location to another many times during its lifetime of service. Therefore, the following steps should be taken to optimize maximum efficient operation.

(1) Check the supply of fuel, crankcase oil and radiator coolant. See Perkins Engine User's Manual for specifications.

(2) Inspect the unit thoroughly to be sure it is in proper working order. Check all fuel lines and wire connections to be certain they are secure. Tighten any loose screws, nuts or bolts.

(3) Wipe off the entire unit and clean the air passages, control panel and other hard to reach places with compressed air not over 25 psi (172 kPa).



PSD-1084

1. Oil Pressure Gauge
2. Tachometer
3. Water Temperature Gauge
4. Current Limit Control
5. Ammeter (Generator)
6. Voltmeter
7. Panel Light
8. Panel Lights Switch
9. Panel Lights Fuse
10. Push-To-Build-Up-Voltage Switch
11. Contactor Control Switch
12. Contactor Closed Light
13. Speed Control Switch
14. Engine On Light
15. Hourmeter
16. (deleted)
17. Engine Start Switch
18. Engine Circuit Fuse
19. Engine Circuit Switch
20. Ammeter (Engine)

Operating Controls and Indicators
(Rear Shelf & Rear Enclosure Models)
Figure 1

(4) Make sure that no loose bars, tools, parts, etc., are in or on any part of the engine as they could cause serious damage to the engine, generator, or personal injury to anyone standing nearby.

(5) If the unit is operated indoors, make sure that an exhaust line is properly connected to the engine exhaust system, and discharged out of doors. Avoid short bends or reduction in line sizes in exhaust pipes. Locate the unit so as to necessitate the shortest possible exhaust line to insure the least amount of back-pressure on the engine. Back-pressure can cause engine damage and loss of power.

(6) Check the electrical system to make sure the connections are secure and properly connected. Check the battery electrolyte level.

(7) Check air cleaner service indicator, and replace air cleaner element if indicator window is red.

C. Starting The Engine

Make sure that all Prestarting Instructions have been carried out, and reference to Initial Preparation For Use has been checked for operating details.

(1) Check engine oil, fuel and coolant levels.

(2) Place speed control switch (13) in IDLE (down) position.

CAUTION: IF THE ENGINE STALLS OR FALTERS IN STARTING, WAIT THREE OR FOUR SECONDS BEFORE RE-ENGAGING STARTER. THIS WILL PREVENT POSSIBLE DAMAGE TO STARTER OR THE ENGINE.

DO NOT OPERATE THE STARTER FOR PERIODS LONGER THAN 15 SECONDS AT A TIME. AN INTERVAL OF AT LEAST TWO MINUTES SHOULD BE ALLOWED BETWEEN CRANKING PERIODS TO PROTECT THE STARTER FROM OVERHEATING.

(3) Hold engine START-RUN-STOP switch (19) in START position.

(4) Press and hold ENGINE START pushbutton (17). Release as soon as engine starts.

(5) Release engine START-RUN-STOP switch (19) to RUN position when oil pressure builds up.

(6) Observe engine RPM on the tachometer, and observe engine for excessive vibration. Idle speed should be 1000 RPM ± 50 RPM. If there is excessive vibration, adjust engine idle speed, gradually increasing or decreasing it - whichever is necessary - until vibration is reduced. For idle speed adjustment procedure, refer to Section 2-3, Para. 2, B, (4).

WARNING: THE ENGINE'S ENTIRE EXHAUST SYSTEM WILL GET VERY HOT AND CAUSE SEVERE BURNS IF TOUCHED.

(7) Allow engine to warm up before applying a load.

D. Generator Operation

(1) Place speed control switch (13) in RATED RPM (up) position. Engine speed will be 2600 RPM.

(2) Press BUILD UP VOLTAGE pushbutton (10). Generator will produce rated voltage.

(3) Adjust STARTING CURRENT rheostat (4) if necessary.

E. Deliver Power

(1) Connect output cable to AIRCRAFT.

(2) Hold CONTACTOR switch (11) in CLOSE position. Release to ON position as soon as green CONTACTOR CLOSED light (12) comes on.

F. Stop Operation Shutdown

(1) Place CONTACTOR switch (11) in OFF position. Light (12) should go off to indicate load contactor has opened and power is no longer available at the aircraft.

(2) Place speed control switch (13) in IDLE (down) position. Allow engine to run for 2 to 3 minutes.

(3) Disconnect output cable from aircraft receptacle and store cable in cable trays or on cable hangers as the case may be.

(4) Place START-RUN-STOP switch (19) in STOP position.

G. Adverse Weather Precautions

(1) Cold weather operation

Operation of engine-driven units at sub-zero temperatures requires special precautions and extra servicing from both operation and maintenance personnel if poor performance or total functional failure is to be avoided. Consult Maintenance and Operator's Manual and recommendations below.

(2) Fuel system

Keep system clean and free from water which may collect in a low spot in the fuel line and freeze, plugging the line. Fuel tanks should be kept FULL to prevent water condensation from the air above the fuel.

(3) Fuel

Keep fuel storage tanks or drums as full as possible to avoid condensation of moisture from the air above the fuel. After filling or moving fuel containers, allow fuel to settle before using. Never draw fuel from the extreme bottom of the container. Strain all fuel to remove any foreign matter. When operating outdoors, take steps to prevent the entry of snow, water and ice into the fuel containers.

(4) Cooling system

Prior to cold weather, drain and flush the cooling system to remove accumulations of rust and sediment. Mix and add antifreeze solution, check the cooling system connections for leaks. Add a can of rust inhibitor to the radiator when system is winterized. This will keep system cleaner and furnish lubrication for the water pump.

(5) Lubrication

Drain the crankcase (preferably when warm after running) and fill with a lighter grade of oil. See Engine Oil Recommendations chart in the Perkins Engine User's Manual for recommended viscosity for various atmospheric temperatures. In cold weather, drain oil more frequently. Water condenses and collects quickly, mixes with the oil and increases deposits to form a sludge. Check oil frequently for this condition. Water in crankcase or oil lines may freeze and cause serious damage to the oil pump, or shut off the oil supply.

(6) Electrical system

In cold weather, the most efficient electrical system is needed to start the cold engine. Check the entire system for loose connections or indication of bad wiring or shorted conditions.

(7) Battery

Battery efficiency decreases sharply with lower temperatures. Maintain the specific gravity of the battery between 1.275 and 1.300 (fully charged condition). Make sure of full charge before attempting to start engine in sub-zero conditions.

H. Operation in Hot and Humid Conditions

(1) Cooling system

Maintain a more frequent check of the coolant level in the radiator.

(2) Battery

The specific gravity and proper level of the battery electrolyte should be maintained. Observe recommendations in the Perkins Diesel User's Manual for proper care of the battery.

I. Operation in Extremely Dusty Conditions

If unit is to be operated under dusty, out-of-door conditions, place in a sheltered area. Take advantage of any natural barriers which may offer protection from blowing dust. If the installation is more than temporary, erect a protection shield.

(1) Fuel system

Change the fuel filter at prescribed intervals and keep fuel containers covered and protected against dust entry.

(2) Oil filter and air cleaner

These both need more frequent attention under dusty conditions. Check air cleaner daily. Replace oil filter cartridge as needed.

(3) Crankcase

The crankcase oil level will bear close attention. Dusty conditions tend to load crankcase oil with dirt. Watch for dirty and gritty oil conditions, and change oil more frequently as required.

J. Operation in Salt Water Areas

(1) Canopy

Wash canopy regularly to remove salt film. Repaint any damaged places and oil the side panel hinges regularly.

(2) Covering

To protect the engine and generator as much as possible from salt water atmosphere, keep the side panels on the canopy closed, when not in use. It is advisable to keep the unit covered with a tarpaulin, if available, while in operation. Salt water should be wiped from the engine, and all terminals and connections in the electrical system wiped dry. Keep all linkage oiled.

(3) Brushes

The brushes of the generator should be inspected regularly to make certain that they are free in the holders. Lift the brushes in the brushholders about every two days to insure their freedom to slide within the holder. Wipe dry all the parts that can be reached, and use compressed air, if available, to dry the parts of the generator that cannot otherwise be reached. See MAINTENANCE for brush care.

(4) Field coils

The fields should be dried as thoroughly as possible. If they have become damp, proceed with recommended procedure in MAINTENANCE section.

(5) Battery terminals

Thoroughly clean the battery terminals and connections. Coat terminals and connections with petroleum jelly to retard corrosion.

K. Miscellaneous

Once a month, oil hinges on the engine compartment doors and the hinged plexiglas cover.

3. Trailer Operation

A. Towing

Observe the following rules when towing the trailer.

(1) Be sure all output cables are disconnected and properly stowed.

(2) Be sure parking brake is released by keeping the drawbar no higher than 30 degrees above horizontal.

(3) Avoid turns which are shorter than the steering linkage will freely allow.

(4) Avoid speeds greater that 15 MPH and sudden turns.

B. Parking

Observe the following rules when parking the trailer.

(1) Always place drawbar in an upright, vertical position and lock it when trailer is parked.

(2) Be sure parking brake is applied. It should be automatically applied when the drawbar is raised.

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CHAPTER 2. SERVICING

SECTION 1. MAINTENANCE INSPECTION/CHECK

1. General

To make certain that generator set is always in good operating condition, it must be inspected, maintained, and lubricated regularly and systematically.

WARNING: STOP OPERATIONS AT ONCE IF A SERIOUS OR POSSIBLY DANGEROUS FAULT IS DISCOVERED.

2. Maintenance Schedule

A. General

Figure 1 provides a suggested schedule for periodic checks and services. Refer to Section 2-2 for lubrication requirements.

B. Maintenance Schedule Check Sheet

It is strongly recommended that the customer use a maintenance schedule check sheet. The check sheet will provide a record of maintenance operations performed and may also serve to improve scheduling for a specific operation.

C. Time Intervals

The schedule is based on both hours of operation and calendar intervals. These two intervals are not necessarily the same. The calendar period is included to make certain services are performed regularly when equipment is being operated infrequently, or at irregular intervals. Hourly time intervals agree with the engine manufacturer's recommendations. Perform all services on a "whichever comes first" basis.

NOTE: Refer to the Perkins Diesel User's Manual for detailed engine maintenance information.

3. Engine and Related Components

See the Perkins Diesel User's Manual for Series 4.236 engines.

4. Inspection and Cleaning

Every day, check for oil, coolant, or fuel leaks. Also check for loose electrical connection. Check oil pressure with engine running at rated RPM (2600). Do not operate engine if oil pressure is less than 15 psi. Wipe accumulated water off from all electrical connections and instruments. Make sure that the alternator ammeter is not discharging, which indicates that the battery is being charged.

	A/R	10 HRS. OR DAILY	100 HRS. OR 2 WEEKS	200 HRS. OR 1 MONTH	400 HRS. OR 2 MONTHS	800 HRS. OR 6 MONTHS
ENGINE						
Check oil level		X				
Check coolant level		X				
Check fuel quantity		X				
Check gages and instruments for proper operation		X				
Change engine oil			X			
Change engine oil filter			X			
Check and tighten drive belts	X			X		
Clean and inspect exterior of radiator				X		
Check exhaust system				X		
Check cooling system					X	
Check and adjust idle speed	X				X	
Check and refill cooling system		(Twice yearly, summer and winter)				
Replace fuel filter	X					X
Clean engine						X
ELECTRICAL SYSTEM (12-V DC)						
Check lights		X				
Check charging rate		X				
Check battery water level			X			
Check battery state of charge				X		
Charge wiring and connections				X		
Check all instruments and gages					X	
Check battery terminals and connectors					X	

Inspection/Check/Maintenance Schedule
Figure 1 (Sheet 1 of 2)

	A/R	10 HRS. OR DAILY	100 HRS. OR 2 WEEKS	200 HRS. OR 1 MONTH	400 HRS. OR 2 MONTHS	800 HRS. OR 6 MONTHS
ELECTRICAL SYSTEM (28.5-V DC)						
Check indicating light		X				
Check operation of all instruments, meters, etc.		X				
Check generator brushes for length, cleanliness, and free operation					X	
Check slip rings for smoothness and cleanliness					X	
Check the entire unit						X
Check overvoltage protection			X			
Check all wiring connections						X
TRAILER						
Lubricate					X	
Check tire inflation					X	
Check and adjust wheel bearings						X
Lubricate wheel bearings						X
Check brake tension					X	

Inspection/Check/Maintenance Schedule
Figure 1 (Sheet 2 of 2)

Every week, wipe off accumulated dust, dirt and oil from the engine and generator. Check all parts for loose connections and wear. If arcing has occurred at any electrical connections, recondition them and securely refasten. Check engine oil and coolant levels.

Every month, check generator for amperage and voltage output. Blow out generator windings with compressed air, not over 25 psi (172 kPa) pressure or remove with a suction-type cleaner with a non-metalic nozzle. If windings should become slightly damp, use space heaters or electrical light bulbs to effectively dry out the windings. If dampness is excessive, apply external heat under a canvas cover, well vented. Heating should not exceed 194° F (90° C).

Pound out any dents in the canopy. Sand, prime, and repaint any dented or rusted spots.

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SECTION 2. MAINTENANCE PROCEDURES

1. General

A suggested Maintenance Schedule is provided in Section 1 of this Chapter. Each step of the schedule is also covered in general in Section 1. This Section covers maintenance in more detail where necessary.

WARNING: STOP OPERATION IMMEDIATELY IF A SERIOUS OR POSSIBLY DANGEROUS FAULT IS DISCOVERED.

2. Lubrication

A. General

Proper lubrication is one of the most important steps in good maintenance procedure. Proper lubrication means the use of correct lubricants and adherence to a proper time schedule. Lubrication points, frequency of lubrication, and recommended lubricants are indicated in Figure 1.

B. Lubrication Chart

Lubrication points are illustrated and identified by name on Lubrication Chart, Figure 1.

Number symbols used to designate the kind of lubricant required and the specification recommended are identified in Figure 2.

Letter symbols used to designate the normal lubrication period are identified in Figure 3.

C. Generator

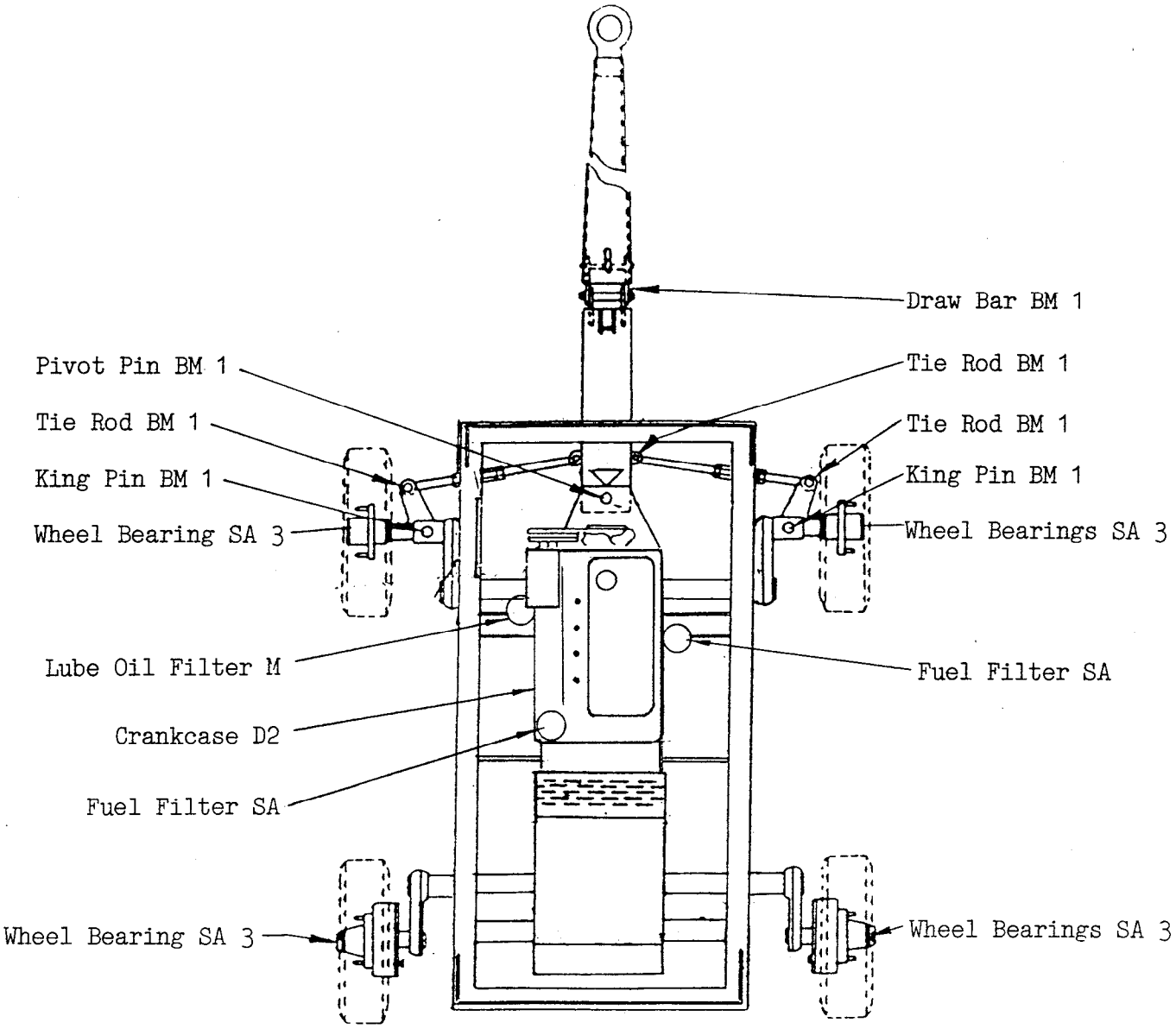
The 28.5 volt DC generator requires NO lubrication. The armature is supported at the rear by a single, ball bearing which is lubricated and sealed at the factory for lifetime, maintenance free operation. The front end of the armature is supported by the engine main bearings.

D. Generator Controls

Generator controls and instruments require no periodic lubrication. A few drops of oil may be required on door hinges occasionally to insure free and quiet operation.

E. Engine

Although the engine and its accessories require no more attention than any other similar installation, they still inherently require a major portion of the generator set lubrication and maintenance. Recommendations regarding engine lubrication have been taken from the Perkins Diesel Users Manual for Series 4.236 engines.



* Check crankcase oil daily; change 200 hours.
** Change oil filter after 200 hours.

Lubrication Chart
Figure 1

SYMBOL	NAME	SPECIFICATION	NOTES
1	Grease, Automtive and Industrial	Federal VV-G-632	Sinclair Litholene Industrial No. 2; Mobil-Mobilplex 47, or equivalent.
2	Oil, Engine, Heavy Duty	MIL-L-46152 or MIL-L-2104C	See Perkins Engine User's Handbook for recommended oil viscosity.
3	Grease, Automotive	Military MIL-G-10924B	Wheel bearings

Lubricants
Figure 2

SYMBOL	TIME INTERVAL
D	10 hours or Daily
BW	100 hours or Biweekly
M	200 hours or Monthly
BM	400 hours or Bimonthly
SA	800 hours or Semiannually

Symbols and Time Intervals
Figure 3

(1) Lubrication schedule

Time schedules indicated on the Lubrication Chart, Figure 1, are approximate. They are based on average operating conditions. It may be necessary to lubricate more frequently under severe operating conditions such as: low engine temperature, high oil temperature, intermittent operation, or dusty conditions. However, time intervals should not exceed those indicated in the chart without careful evaluation.

The use of quality lubricating oil, combined with proper oil drain and filter change intervals are important factors in extending engine life.

(2) Oil specification

Lubricating oils must be equal to the U.S. Ordnance specification MIL-L-46152 or MIL-L-2104C. Lubricating oils for use in Perkins diesel engines must have a minimum viscosity index of 80.

(3) Oil viscosity

Always ensure that the correct viscosity grade of lubricating oil is used for the temperature range in which the engine will operate as shown below.

AMBIENT TEMPERATURE RANGE	VISCOSITY #
0°F (-18°C) to 30°F (-1°C)	10W
30°F (-1°C) to 80°F (27°C)	15W/40
Above 80°F (27°C)	15W/40

Temperature and Oil Viscosity Chart
Figure 4

(4) Change lubrication engine oil (100 hours)

Oil should be changed after each 100 hours of engine operation. The generator set is equipped with an hourmeter which records actual engine operating time. The ideal time to change oil is soon after a power delivery run when the engine is at operating temperature.

NOTE: If lubricating oil is drained immediately after the unit has been run for some time, most of the sediment will be in suspension and oil will drain readily without clinging to internal surfaces.

CAUTION: DO NOT USE SOLVENTS AS FLUSHING OILS IN RUNNING ENGINES.

Change the oil filter each time the oil is changed.

Change oil as follows:

(a) Provide a container for catching used oil. Capacity should be greater than 2 gallons.

(b) Remove drain plug located in oil pan. Allow sufficient time for oil to drain from valve train, timing gear case, etc., before reinstalling plug.

(c) Change oil filter while oil is draining [see Para. 2, E, (5) below].

(d) Clean drain plug and reinstall. Do not over-tighten.

(e) Remove filler cap on valve cover and refill crankcase with new, clean oil of proper specification and viscosity [see Para. 2, E, (2) and Figure 4]. 7 quarts are required when oil filter is changed.

(f) Start engine and allow it to idle. Oil pressure should come up to normal quickly. Check for oil leaks at filter and drain plug.

(g) Stop engine. Allow several minutes for oil to drain to crankcase, then check oil level. It should be at FULL mark on dipstick.

(h) Check hourmeter and record time of oil change.

(5) Change engine oil filter (100 hours)

(a) Place a container under the oil filter to catch oil drippings.

(b) Loosen filter with a special oil filter removal wrench. Several types are available. Discard oil filter.

(c) Coat the gasket on the new filter with oil.

(d) Place the new filter in position on the cylinder block and spin on until the gasket contacts the adapter face; then hand tighten another 1/2 turn. Do not over-tighten.

(e) Start engine and check filter gasket for leaks.

F. Trailer

(1) Front axle assembly

The front axle assembly, drawbar, and steering linkage are equipped with high pressure lubrication fittings. Lubricate the trailer each 400 hours. Use a good quality chassis lubricant (See Figure 2). Clean lube fittings before applying grease.

(2) Wheel bearings

Lubricate and check wheel bearing adjustment each 800 hours or semiannually. Use a good quality bearing lubricant (See Fig. 2).

3. Servicing the Air Cleaner

Refer to Figure 5. The air cleaner is a dry type with replaceable filter cartridges. A definite time schedule for changing the filter cartridge cannot be determined because of varying operating conditions. Change the filter cartridge when the red indicator "flag" becomes fully visible in the viewing chamber (9) and locks in that position. Change the cartridge as follows:

A. Cartridge Removal

(1) Open left front canopy door to gain access to the air cleaner.

(2) Remove clamp assembly (3) from air cleaner, and remove cup assembly (8) with the baffle (7).

(3) Remove wing nut (6) and washer gasket (5).

(4) Remove cartridge (4), and replace it with a new cartridge.

CAUTION: DO NOT ATTEMPT TO CLEAN OR RE-USE OLD CARTRIDGE.

(5) Inspect the interior of the cleaner housing (1). Make certain that it is free from all foreign material.

B. Cartridge Installation

(1) Carefully install the new cartridge into the housing. Avoid bumping the cartridge tubes against the housing sealing flance. Seat the cartridge properly within the housing. Press all edges and corners of the cartridge firmly with fingers to make a positive air seal against the sealing flange of the housing.

CAUTION: UNDER NO CIRCUMSTANCES SHOULD THE CARTRIDGE BE POUNDED OR STRUCK IN THE CENTER TO AFFECT A SEAL.

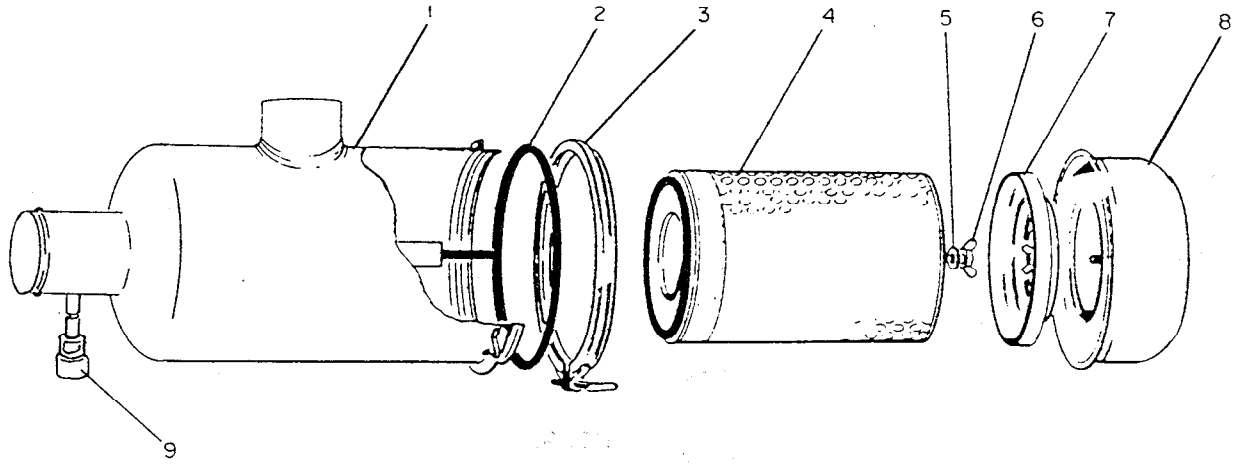
(2) Lock the cartridge in place with the washer gasket (5) and the wing nut (6). Then install the baffle (7) into the cup assembly (8) and fasten it to the end of body (1) with clamp (3). Tignten clamp (3) down in place.

4. Servicing the Fuel Filter

Refer to Perkins Diesel User's Handbook in Chapter 6 for instructions on removal and replacement of fuel filter elements.

5. Drive Belt Service

Check all drive belts and adjust if necessary each 200 hours. Refer to Perkins Diesel User's Manual in Chapter 6 for proper procedures.



1. Body Assembly
2. "O" Ring
3. Clamp Assembly
4. Cartridge
5. Washer Gasket
6. Wing Nut
7. Baffle
8. Cup Assembly
9. Indicator with Viewing Chamber

Air Cleaner Cartridge Replacement
Figure 5

6. Engine Cooling System

A. General

NOTE: Refer to the Perkins Diesel User's Manual in Chapter 6 for detailed instructions on servicing the engine's cooling system.

During warm weather operation, when plain water is used as a coolant, the cooling system MUST be protected against rust by a rust inhibitor additive. During cold weather operation the system MUST be protected against freezing. The system should NEVER be operated on plain water, without a rust inhibitor or antifreeze.

WARNING: WHEN REMOVING THE CAP FROM A VERY HOT RADIATOR, COVER THE CAP WITH A THICK CLOTH AND TURN IT SLOWLY COUNTERCLOCKWISE TO THE FIRST STOP. WHEN PRESSURE IS COMPLETELY RELEASED, PRESS DOWNWARD AND FINISH REMOVING CAP.

CAUTION: DO NOT ADD COOLANT TO AN EXTREMELY HOT ENGINE. THIS CAN RESULT IN A CRACKED BLOCK OR CYLINDER HEAD.

B. Rust Inhibitor

Use only a corrosion inhibitor that is compatible with aluminum. Do not use inhibitors labeled as "acid neutralizer".

C. Antifreeze

A permanent type (Ethylene Glycol) antifreeze is recommended for use in the cooling system. The coolant, when mixed as equal parts of water and the recommended antifreeze, will provide protection to -35 degrees F.

7. Battery Service

A. General

Two 12-volt batteries connected in parallel supply power for operation of the engine electrical system, clearance and panel lights, and for flashing the generator.

B. Battery Location and Accessibility

The batteries are located in a tray directly beneath the cooling fan at the front of the unit. These batteries are easily accessible for service by removing two 1/4-inch wing nuts and lifting out the battery access panel at the bottom front of the unit.

C. Battery Care

(1) Never allow a battery which has been removed from a unit to sit on concrete, ground, or metal, unless proper insulation is provided. A wooden platform or board will parovide sufficient insulation.

(2) Maintain stored batteries in a charged condition.

(3) Be sure batteries are fastened securely in their compartment to avoid damage from vibration.

(4) Maintain battery fluid at proper level.

(5) Keep battery terminal posts and lead cable connectors clean.

WARNING: NEVER ALLOW SPARKS OR OPEN FLAME NEAR BATTERIES. AVOID SPILLING ELECTROLYTE ON HANDS OR CLOTHING.

D. Liquid Level

The electrolyte in each cell should be above the plates at all times to prevent battery failure. Check the level of the electrolyte every two weeks. When electrolyte level is low, add pure distilled water. Do not use hydrant water or any water which has been in contact with a metal container. Acid should never be added except by a skilled battery man.

CAUTION; NEVER ADD ANY SPECIAL BATTERY DOPES, SOLUTIONS, OR POWDERS.

NOTE: It is especially important to keep the batteries at full charge for cold weather operation. Add distilled water to the batteries in freezing temperatures only when the engine is to operate for several hours, to thoroughly mix the water and the electrolyte, or damage to the battery will result from the water freezing.

E. Cleaning the Batteries

If the top of the batteries are dirty, they may be cleaned with a brush dipped in ammonia or soda solution. Disconnect lead connectors from battery posts. Vent plugs should be tightened to prevent cleaning solution from entering cells. Clean batteries as required, using brush and cleaning solution. Flush off the batteries with clean water. Brighten terminal and post surfaces with steel wool, a wire brush, or special terminal cleaning tool. Make certain that vent holes in filler caps are not clogged.

F. Testing a Battery

Tests are made on a battery to determine the state of charge and also its condition. The results of these tests show whether the battery is good, needs recharging, or must be replaced. If a battery has failed, is low in charge, or requires water frequently, the reason for the condition must be found and corrected. Visually inspect the battery before testing, to determine if it has been damaged. Moisture on the outside of the case, or low fluid level in one or more cells indicates possible battery damage (cracked case, etc.). The battery may be tested by two methods. A battery-starter Tester may be used to determine the battery's ability to deliver current. A battery hydrometer test determines the charge condition of the battery.

(1) Test with Battery-Starter Tester

Connect battery to the tester according to instructions furnished with the instrument. Test battery according to tester instructions. If the test determines that the battery has acceptable voltage, this indicates that the battery has output capacity and will accept a charge if required.

(2) Test with Hydrometer

(a) Remove filler caps and check the specific gravity of the electrolyte in each cell. If specific gravity is 1.230 or below, add water if necessary and charge the battery until it is fully charged. A fully charged battery will give a specific gravity reading of 1.265 to 1.285. The specific gravity of a fully discharged battery may range from 1.140 down to 1.120.

NOTE: The battery is fully charged when all cells are gassing freely, and the specific gravity ceases to rise for three successive readings taken at hourly intervals.

(b) If the battery starter test indicated that battery voltage was below the acceptable voltage value, test each cell with the hydrometer. If the difference in specific gravity readings between any two cells is 50 points (0.050) or more, the battery isn't satisfactory for service and should be replaced.

8. Generator Maintenance

A. General

The only maintenance service required for the generator will be brush replacement, slip ring cleaning, etc.

B. Brush Service

(1) Cleaning

If inspection reveals that brushes are gummy or sticking in the brushholders, they should be removed and cleaned. Clean both the brushes and brushholders. Use a good, SAFE, commercial cleaner. DRY ALL PARTS THOROUGHLY. Be sure brushes can move freely in brushholders.

WARNING: DO NOT USE A FLAMMABLE SOLVENT. DO NOT USE STEAM CLEANER, OR SOAPS AND DETERGENTS UNDER PRESSURE.

C. Generator Revolving Field Brush Replacement

See Figure 6

(1) Disconnect leads (A) from connectors on brushholder caps (B).

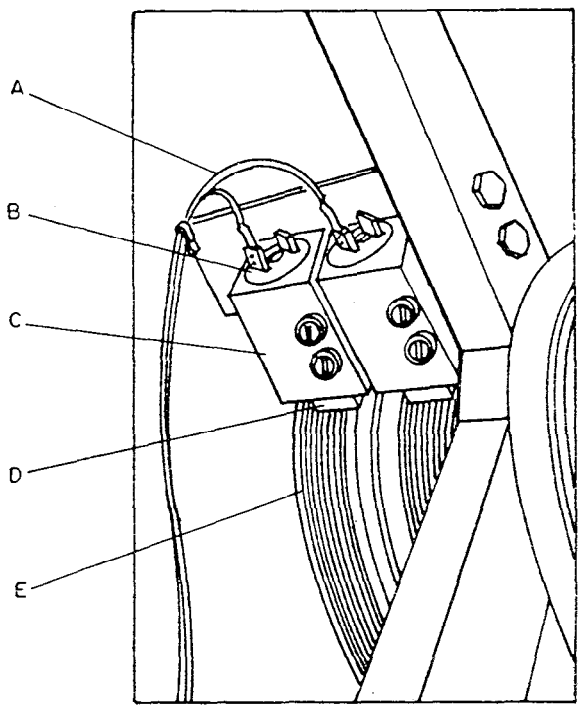
CAUTION: WHEN REMOVING THE LEAD WIRES, DO SO ONE AT A TIME AND REPLACE EACH BRUSH ACCORDINGLY, TO INSURE THAT THE LEAD WIRES ARE PUT PACK ONTO THE PROPER BRUSHES.

(2) Lift brush (D) from brushholder (C) for inspection. If brushes are worn unevenly or are shorter than 7/16 inch (11 mm), replace them.

(3) Inspect slip rings whenever brushes are removed for servicing brushes or brushholders. Note surface conditions of rings. Surface should appear smooth and clean. Scoring or roughness of slip rings may be caused by grit or abrasive substance in brushes, or by oil on the rings. Moderately rough slip rings can be smoothed by holding grade 00 flint paper against their surface while the rings are revolving slowly. If the rings are badly scored, the unit must be sent to an overhaul facility for repair. After cleaning slip rings, blow dirt and grit out of the unit with compressed air. Do not use over 25 psi (172 kPa) air pressure to blow dirt out.

(4) Slip new brushes into brushholder guides, and place caps on top, and screw them into the guides to a "bottomed" position. The spring attached to the brush will determine the pressure at which the brush contacts the slip rings.

(5) To fit new brushes to the slip rings, lay a strip of No. 00 sandpaper, smooth side down, on slip ring surface, and draw the sandpaper in the direction of rotation of the slip ring, lifting the brush on the return stroke. Continue until the brushes have same curvature as the slip rings. Blow all carbon dust out of the machine using not over 25 psi (172 kPa) air pressure.



A-Leads
B-Brushholder Caps
C-Brushholder
D-Brush
E-Slip Rings

Generator Revolving Field Brushes
Figure 6

SECTION 3. ADJUSTMENT/TEST

1. General

The adjustments and test procedures presented below are required after major repairs, parts replacement, or long storage.

2. Testing the Generator Set

Test values listed below will result when the generator set is operating properly. If your test results are not within the limits shown, perform the applicable troubleshooting procedures given in Chapter 3.

If major repairs have been made or if critical components have been replaced, make sure that the applicable adjustments have been made before testing the generator set. Adjustment procedures are described in Para. 3 of this Section.

A. Preoperational Test Procedures

(1) Open engine compartment doors and inspect the interior for rags, tools, and other foreign materials.

(2) Check engine oil level.

(3) Check coolant level.

(4) Check battery water level.

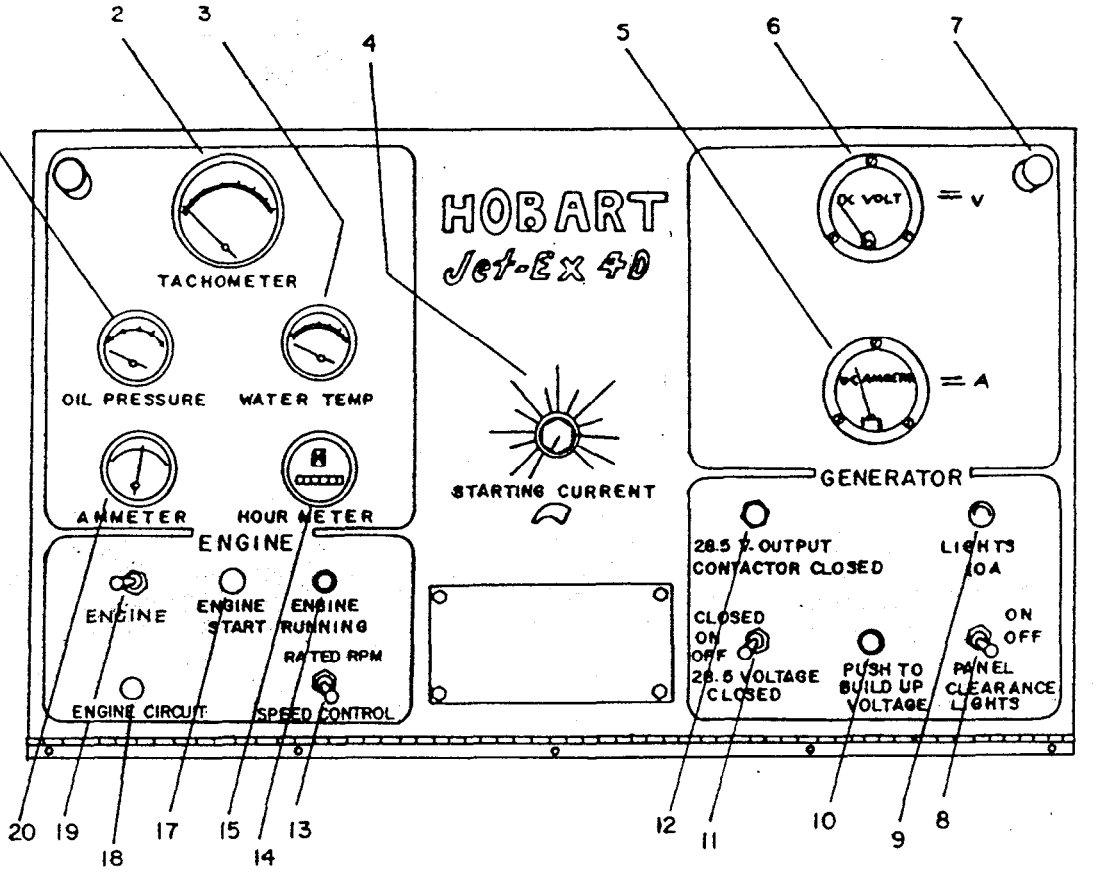
(5) Check for sufficient fuel.

(6) Check drive belts. Each belt should have approximately 1/2 inch (13 mm) slack.

(7) Inspect all wiring for possible trouble spots such as loose wires or terminals, frayed insulation, obvious shorts, etc.

(8) Check panel lights, panel light switch, and fuse.

(9) Connect cables from generator output terminals to a load bank. Use cables of the same size and length as those used in service, preferably No. 2/0, not more than 30 feet (9 m) long.



PSD-1084

1. Oil Pressure Gauge
2. Tachometer
3. Water Temperature Gauge
4. Current Limit Control
5. Ammeter (Generator)
6. Voltmeter
7. Panel Light
8. Panel Lights Switch
9. Panel Lights Fuse
10. Push-To-Build-Up-Voltage Switch
11. Contactor Control Switch
12. Contactor Closed Light
13. Speed Control Switch
14. Engine On Light
15. Hourmeter
16. (Deleted)
17. Engine Start Switch
18. Engine Circuit Fuse
19. Engine Circuit Switch
20. Ammeter (Engine)

Operating Controls and Indicators
(Rear Shelf & Rear Enclosure Models)
Figure 1

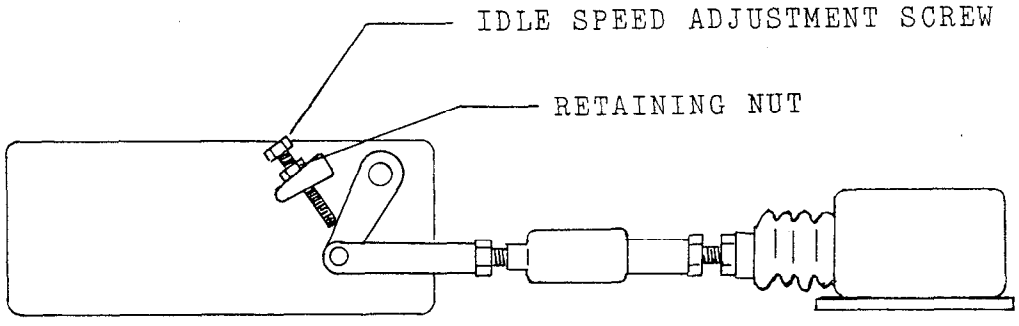
B. Operational Tests

(1) Start the engine as described in 1-3; Para. 3 (a), and let it warm at idle speed.

(2) Inspect for oil, fuel and coolant leaks.

(3) Check the engine ammeter (20, Fig. 1) for a slight charge. Check oil pressure gauge (1). It should read 35 to 60 psi (241 to 414 kPa). Check coolant temperature gauge. It should read 180 to 200 deg. F (82 to 93 deg. C.) when engine is hot.

(4) Observe engine RPM on the tachometer, and observe engine for excessive vibration. Idle speed should be 1000 RPM ± 50 RPM. If there is excessive vibration within this range, adjust engine idle speed, gradually increasing or decreasing it - whichever is necessary - until vibration is reduced. Refer to Figure 2 below. To adjust idle speed, loosen idle speed retaining nut and adjust idle speed screw on throttle assembly to raise idle speed, while observing tachometer and observing engine vibration. Turning idle speed screw INWARD increases idle speed, and turning it OUTWARD decreases idle speed. When vibration has been satisfactorily reduced, tighten idle speed retaining nut.



Idle Speed Adjustment
Figure 2

(5) Check engine RPM's at operating speed: 2600 RPM

(6) Depress the PUSH TO BUILD UP VOLTAGE Switch to build up output voltage of generator.

(7) Set current limit control (4, Figure 1) to maximum, full clockwise, position.

(8) Adjust the load bank for a load of 550 amperes.

(9) Place the contactor control switch (11) in the CLOSE position. CONTACTOR CLOSED light (12) will glow and the contactor will close. Release the switch to the center ON position. The tachometer (2) will indicate 2550 ± 25 RPM.

(10) Disconnect the load bank and check the overvoltage protection by adjusting voltage regulator potentiometer R46 (1, Fig. 3) to increase the voltage. The overvoltage relay will trip and open the load contactor at 32 to 34 volts in 2 to 10 seconds.

(11) Readjust the voltage to 28.5 volts, connect the load bank, set it at 550 amperes, and close the contactor.

(12) Remove load bank and check voltage regulation at no load. Voltage will be 28.5 volts. Reconnect load bank and check voltage regulation with load bank set at 137, 275, 413, 550, and 660 amperes and check voltage at each setting. Voltage will be 28.5 ± 1 volts at each different load.

(13) With current limit control (4) set to 2000, apply 600 to 700 amperes load to the generator and then set the current limit control (4) to 400. Current displayed on ammeter (6) will be 400 ± 40 amperes.

NOTE: Voltage will not drop below 12 volts.

(14) Set current limit control to 2000 and apply 1200 amperes load. Then set current limit control to 1000. Current displayed on ammeter will be 1000 ± 100 amperes and voltage will not drop below 12 volts.

(15) Restart the engine, check the instruments as directed in step (3), and check the entire generator set for unusual vibration and noises.

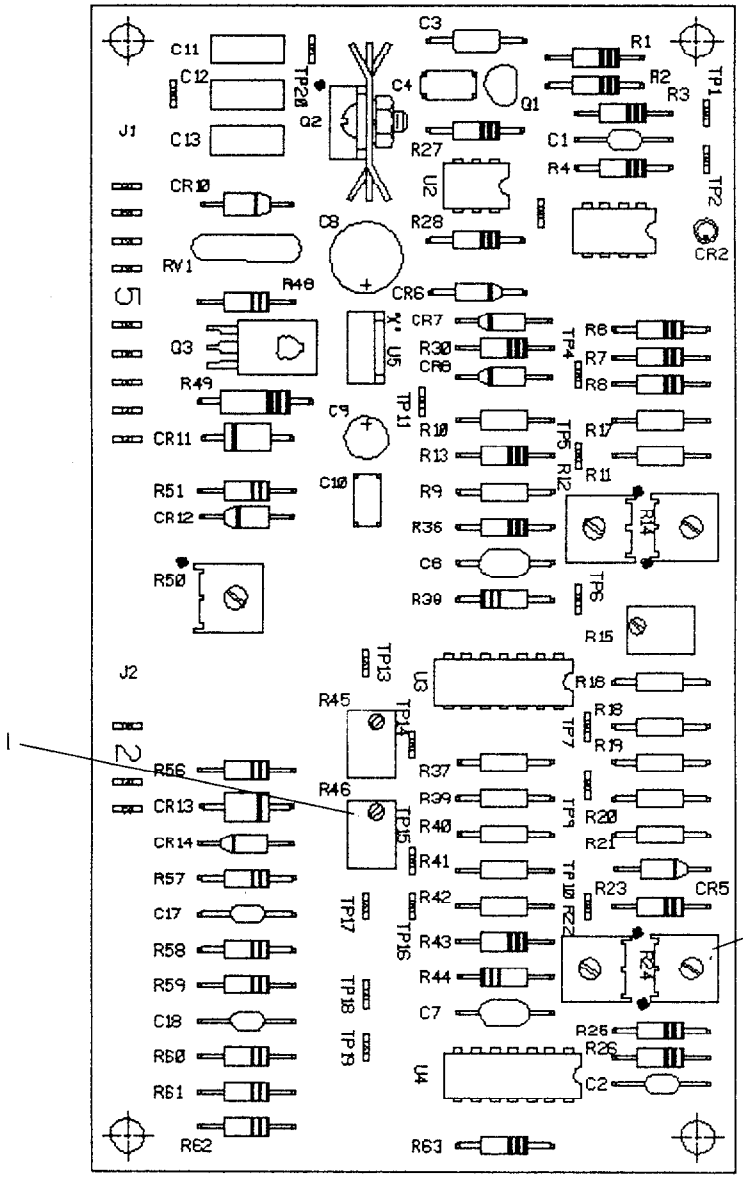
3. Voltage Regulator Adjustment

A. 28.5 Volt Adjustment

The regulating voltage, in the 28.5 volt range, is determined by the position of the wiper arm of the multi-turn potentiometer R46 Clockwise (CW) rotation increases the voltage level at which the unit operates. Conversely, counterclockwise (CCW) rotation decreases the voltage level.

B. Line Drop Compensation

Line drop compensation allows the voltage at the load end of the output cable to remain constant despite the voltage drop associated with the output cable. Clockwise (CW) rotation of the single-turn potentiometer (R24) increases the compensation. This potentiometer should be set for flat regulation of voltage at the load end of the output cable when delivering rated load current.



1. 28.5V Voltage Adjustment
2. Line Drop Compensation Voltage Adjustment

Voltage Regulator Adjustment
Figure 3

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CHAPTER 3. TROUBLESHOOTING

SECTION 1. TROUBLESHOOTING PROCEDURES

1. General

Troubleshooting is an orderly process of checking and eliminating possible causes of trouble until the exact cause of a trouble is found. As a rule, the best place to start looking for the cause of a trouble in a circuit is at the source of power. Continue testing and checking the circuit, step-by-step, in an orderly manner, until the cause of trouble is located. See connection and schematic diagrams.

2. Troubleshooting Chart

A. Description

The troubleshooting chart lists information under three headings:

(1) Trouble, symptom, and condition.

(2) Probable cause

(3) Test, check and remedy

B. Use of the Troubleshooting Chart

Read the trouble symptoms and conditions before proceeding to causes and remedies. For example, at the beginning of the troubleshooting chart under ENGINE, the first trouble listed is: "Engine will not start. Starter will NOT crank engine." If the starter WILL crank the engine, then obviously this is not your symptom and condition. Go the next trouble and symptom directly below.

If the starter will NOT crank the engine, look to the right under PROBABLE CAUSE and TEST, CHECK, AND REMEDY and find the various things which could cause the trouble and what to do to check and remedy them.

3. Equipment for Troubleshooting

A good quality, multi-scale voltohmmeter is the only instrument required for troubleshooting. At least two jumper leads with "alligator", or similar clips, will be required. The 12 volt engine electrical system may be used for a 12 volt DC power source.

4. Safety

WARNING: LOOSE GARMENTS, NECKTIES, AND OTHER HANGING ITEMS MUST NOT BE WORN BY PERSONNEL NEAR THE FAN OR OTHER EXPOSED MOVING PARTS OF THIS EQUIPMENT WHILE IT IS RUNNING. ALSO, AVOID CONTACT WITH LIVE ELECTRICAL PARTS. DEATH OR SERIOUS INJURY COULD RESULT!

5. Diagrams

A schematic diagram of the generator set is provided in Chapter 6. This diagram can be very helpfull in troubleshooting. Components shown in the diagram are identified by reference designators (or item names in some instances). A legend appearing on the diagram identifies each reference designator by its full item name. For example, the symbol K403 identifies the overvoltage relay, and M406 identifies the voltmeter.

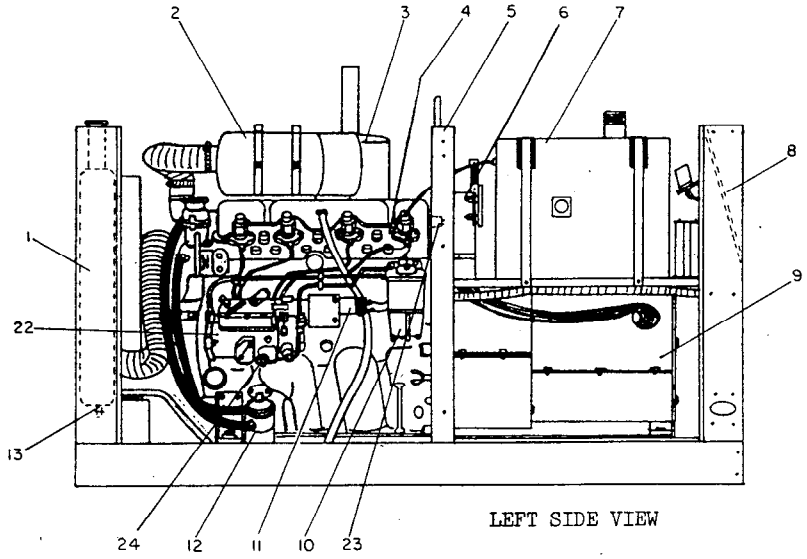
A connection diagram is also provided in Chapter 6. It also can be very helpful in troubleshooting, parts replacement, etc.

6. Illustrations

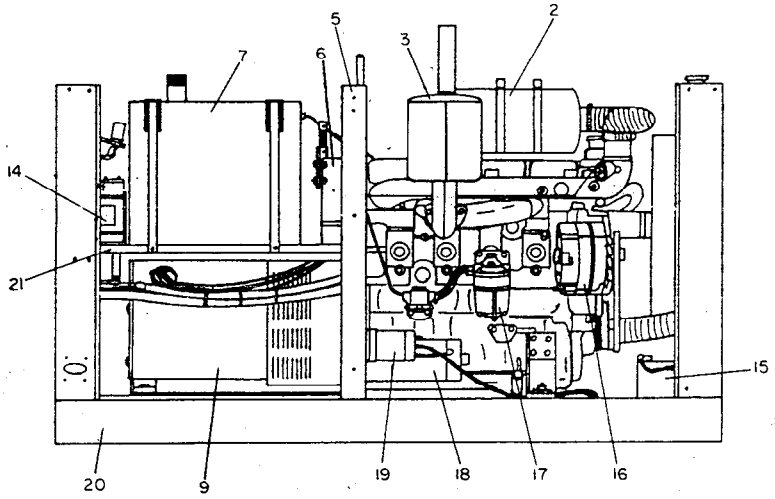
To aid maintenance personnel with troubleshooting, three illustrations are provided in this section, showing the locations of various components of the generator set.

7. Connections and Wiring

Before condemning any electrical component, check all connections and wiring which could affect its operation. In many instances a component may be non-functional simply because it is not receiving power because of a loose connection or a poor ground. In most cases throughout the troubleshooting chart, it will be assumed that connections and wiring have been checked.



LEFT SIDE VIEW

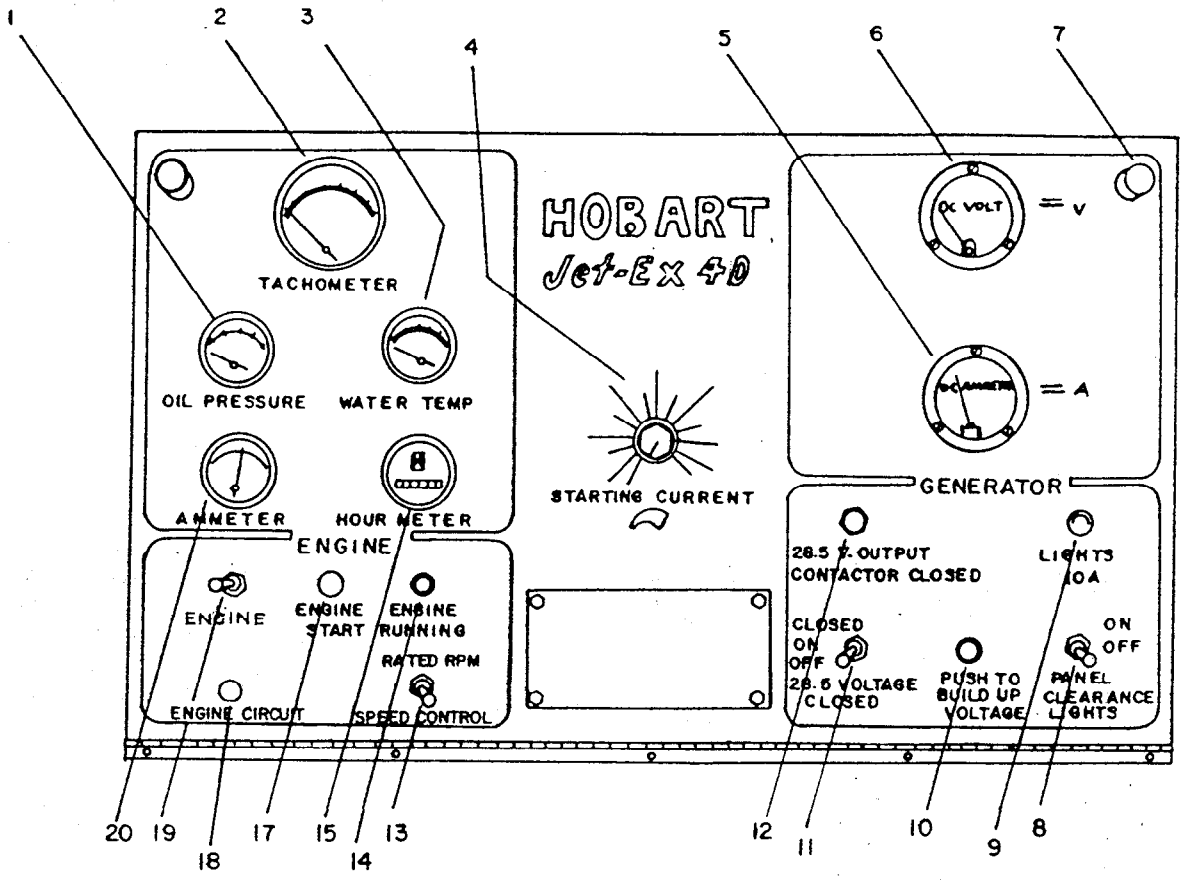


RIGHT SIDE VIEW

PSD-1139

1. Radiator
2. Air cleaner
3. Muffler
4. Engine
5. Lifting yoke
6. Rectifier assembly
7. Fuel tank
8. Control panel
9. Generator
10. Fuel filter
11. Throttle control assembly
12. Oil filter
13. Drain cock
14. Load contactor
15. Batteries
16. Alternator
17. Fuel filter
18. Starter
19. Starter relay
20. Frame
21. Fuel tank support
22. Engine governor
23. Water temperature sender & switch
24. Oil pressure sender & switch

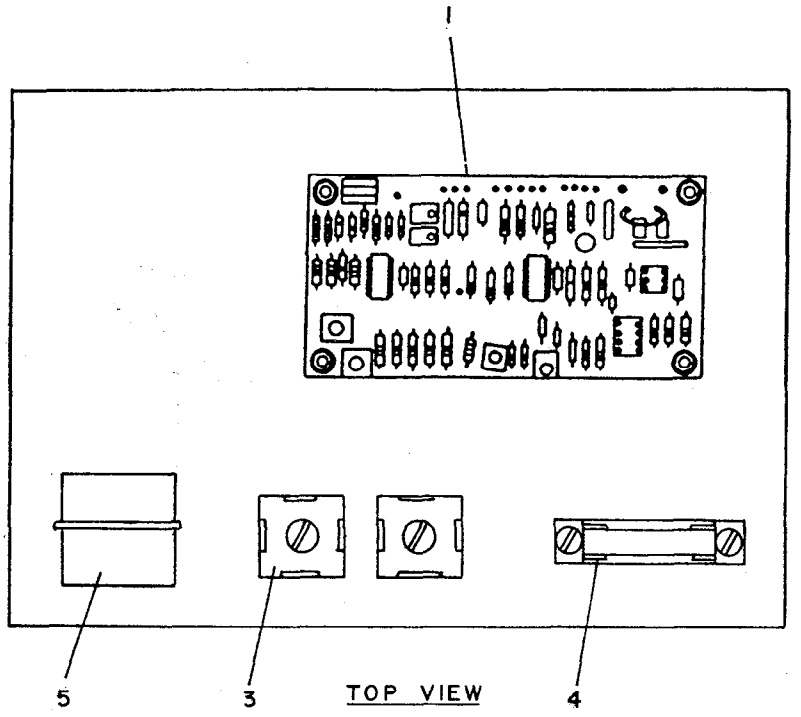
Generator Set Components
Figure 1

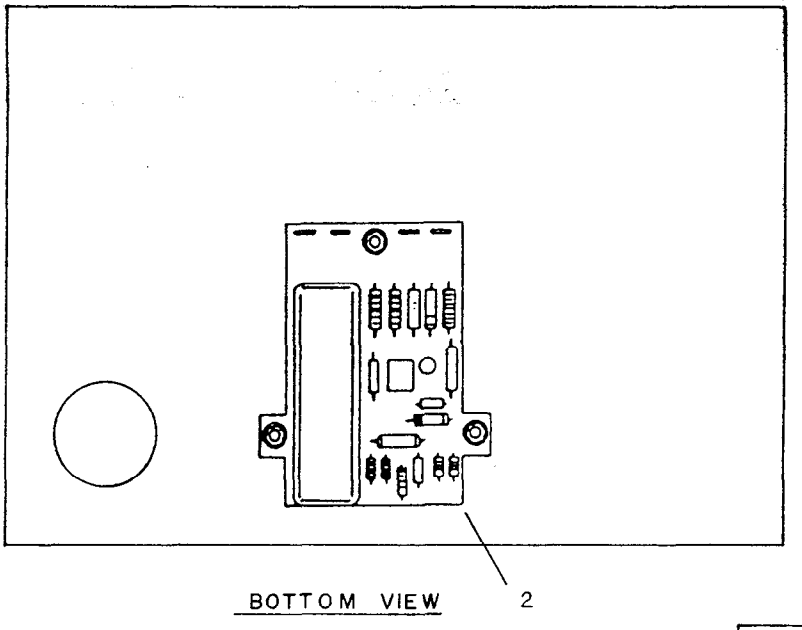


PSD-1084

1. Oil Pressure Gauge
2. Tachometer
3. Water Temperature Gauge
4. Current Limit Control
5. Ammeter (Generator)
6. Voltmeter
7. Panel Light
8. Panel Lights Switch
9. Panel Lights Fuse
10. Push-To-Build-Up-Voltage Switch
11. Contactor Control Switch
12. Contactor Closed Light
13. Speed Control Switch
14. Engine On Light
15. Hourmeter
16. (Deleted)
17. Engine Start Switch
18. Engine Circuit Fuse
19. Engine Circuit Switch
20. Ammeter (Engine)

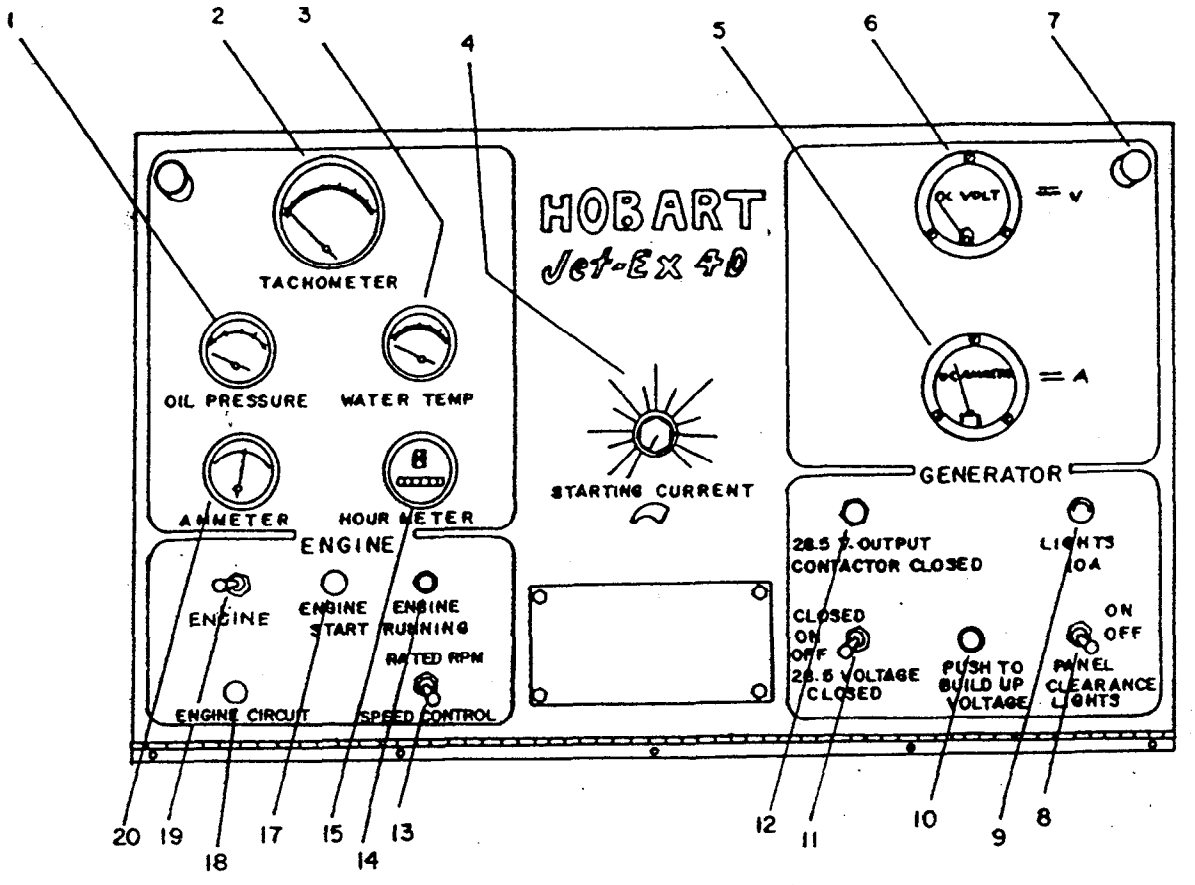
Control Panel Assembly
(W/Shelf On Rear)
Figure 2





1. Voltage Regulator
2. Overvoltage Relay
3. Control Winding Rectifier
4. Voltage Regulator Fuse
5. Voltage Sensing Relay

Voltage Regulator Support
(W/Shelf On Rear)
Figure 3



PSD-1084

1. Oil Pressure Gauge
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14. Engine On Light
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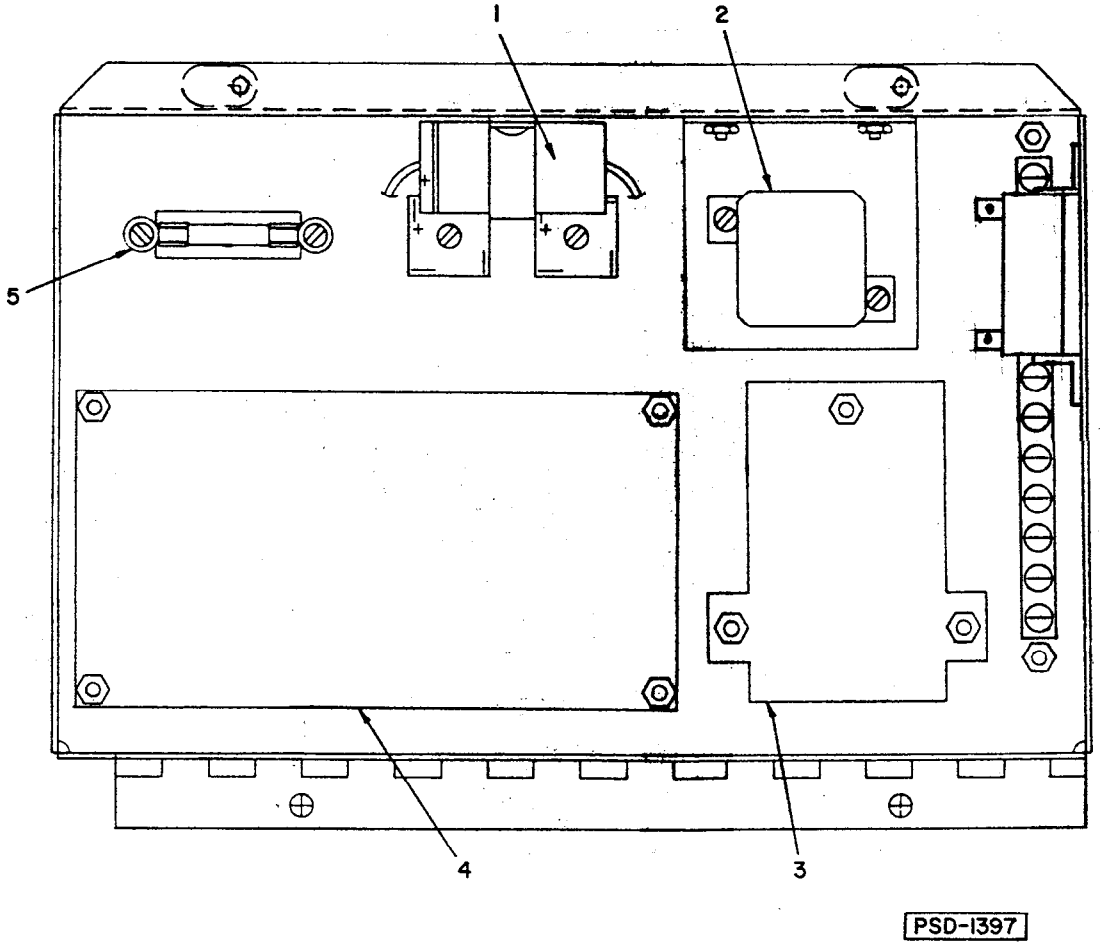
17. Engine Start Switch
18. Engine Circuit Fuse
19. Engine Circuit Switch
20. Ammeter (Engine)

Control Panel Assembly
(W/Enclosure On Rear)
Figure 4



1. Excitation Rectifiers
2. Voltage Sensing Relay
3. Overvoltage Relay
4. Voltage Regulator
5. Voltage Regulator Fuse

Voltage Regulator Support
(W/Enclosure On Rear)
Figure 5

TROUBLE, SYMPTOM AND CONDITION	PROBABLE CAUSE	TEST, CHECK, AND REMEDY
ENGINE AND CONTROLS		
1. Engine will not start. Starter will not crank engine.	A. Batteries discharged, or loose battery or ground connection.	A. Check battery connections and check voltage across battery. Voltage should be approximately 13.5 VDC. Be sure this voltage is reaching starter relay input terminal. If battery and connections are good, proceed to Step B.
	B. Engine pushbutton start switch (S401) defective.	B. Momentarily connect large capacity jumper cable between the hot side of the starter relay (L401) and the start switch terminal on the starter relay (yellow-blue wire. If the starter operates, check pushbutton start switch (17, Fig. 2). Replace faulty switch. If starter doesn't crank, proceed to Step C.
	C. Defective starter relay (L401).	C. Momentarily connect a large capacity jumper cable between the hot side of the starter relay (19, Fig. 1) and the starter input terminal. If the starter attempts to crank the engine, the starter solenoid is defective. Replace it. If engine still won't crank, proceed to Step D.
	D. Defective starter. (B401).	D. If starter did not attempt to operate in Step C above, the starter is defective. Replace starter. If starter did attempt to operate, but couldn't turn engine, proceed to Step E.

Troubleshooting Chart (Sheet 1 of 11)
Figure 6

TROUBLE, SYMPTOM AND CONDITION	PROBABLE CAUSE	TEST, CHECK, AND REMEDY
ENGINE AND CONTROLS		
1. Engine will not start. Starter will not crank engine. (Cont'd)	E. Internal engine seizure.	E. CAUTION: MAKE CERTAIN THAT ENGINE START SWITCH IS IN "STOP" POSITION SO THAT ENGINE DOES NOT START. Use a socket wrench on the front crankshaft pulley to try to turn engine by hand. If engine will not turn, internal damage is indicated. NOTE: If engine is over-charged with ether for cold weather starting, it could seize up. If so, wait approximately 1/2 hour until it will be possible to turn engine.
2. Engine will not start. Starter DOES crank engine.	A. Engine circuit fuse (F402) blown or-	A. Replace engine circuit fuse (18, Fig. 2). Use type AGC-20 fuse.
	B. Fuel valve at tank closed, or no fuel in tank, engine has lost its prime, or -	B. Check and correct as required.
	C. Defective engine start switch (S404) or -	C. Check for 12-V DC from terminal 4 of S404 to ground with S404 in "START" position. If 12-V DC is not measured, replace defective switch.
	D. Defective fuel valve solenoid (L404).	D. Attempt to start engine while applying 12-V DC to the fuel valve solenoid. If the engine starts, the solenoid is defective, and should be replaced. If engine still doesn't start, proceed to Step D.
	E. Defective fuel pump.	E. Check fuel pump according to instructions in the Perkins Diesel User's Manual.

TROUBLE, SYMPTOM AND CONDITION	PROBABLE CAUSE	TEST, CHECK, AND REMEDY
ENGINE AND CONTROLS		
3. Engine starts then stops.	A. Fuel not turned on.	A. Turn on fuel shutoff valve.
	B. Defective oil pressure switch (S403) located on engine block.	B. Connect a jumper wire across the "C" and "No" terminals of oil pressure switch. Start engine and check oil pressure. If it is below 10 PSI (69 kPa) shut down the engine and check lubrication system for leaks. Check also the oil pump. If oil pressure comes up to normal, and the engine continues to run, the oil pressure switch is defective. Replace oil pressure switch. If oil pressure switch is good, proceed to Step C.
4. Engine starts then stops when engine switch (S404) is released to "ON" position.	A. Open overtemperature switch (S402) or defective engine switch (S404).	A. Place a clip-lead jumper wire on the water temperature switch terminals. If engine then starts properly, replace water temperature switch. If not, replace engine switch.
	B. Choked fuel filter, restriction in air cleaner, or air in fuel system.	B. Check for these faults according to instructions in Perkins Diesel User's Manual.
5. Engine does not attain normal idle RPM, or idles too fast.	A. Idle speed set either too high or too low.	A. Adjust idle speed to approximately 1000 $\pm$ 50 RPM.
	B. Loose throttle linkage	B. If solenoid core is pulled into the full throttle solenoid (L403) when S406 is in RATED RPM position, check for loose control wire between solenoid and throttle. Tighten if required. If solenoid core does not pull in, proceed to step C.

TROUBLE, SYMPTOM AND CONDITION	PROBABLE CAUSE	TEST, CHECK, AND REMEDY
ENGINE AND CONTROLS (Cont'd)		
5. Engine does not attain normal idle RPM, or idles too fast. (Continued)	C. Defective full throttle solenoid (L403).	C. Check for 12-V-DC across two terminals of solenoid when S406 is in RATED RPM position. If 12-V DC is measured, but solenoid core does not pull in, replace the solenoid.
6. Engine will not run at rated speed (2600 RPM)	A. Speed control switch (S406) defective.	A. If engine will not go from idle to rated speed when speed control switch (13, Fig. 2) is in RATED RPM position, turn off engine and take resistance measurements at speed control switch terminals with switch in the RATED SPEED position. Zero resistance should be measured between terminals having red-blue and orange-yellow wires. Replace speed control switch if measurement is improper.
7. Engine lacks power.	A. Insufficient air to engine.	A. Check and service air cleaner.
	B. Restricted exhaust system.	B. Check exhaust pipe for restrictions. Check muffler for clogged condition. Replace as required.
	C. Low compression.	C. Check compression in all cylinders according to Perkins Engine User's Manual.
8. Engine overheats.	A. Dirt or sludge in coolant	A. Drain coolant, flush radiator, put in clean coolant. Refer to Perkins Engine User's Manual in Chapter 5 for instructions.
	B. Debris and dirt in radiator core.	B. Clean radiator core carefully. Refer to Perkins Engine User's Manual.

TROUBLE, SYMPTOM AND CONDITION	PROBABLE CAUSE	TEST, CHECK, AND REMEDY
ENGINE AND CONTROLS (Cont'd)		
8. Engine overheats. (continued)	C. Fan belt slips or is broken.	C. Tighten belt or replace as required.

TROUBLE, SYMPTOM AND CONDITION	PROBABLE CAUSE	TEST, CHECK, AND REMEDY
GENERATOR AND CONTROLS		
1. Generator will not build up voltage at all when push-to-build-up voltage switch (S407) is operated. Engine running normally	A. Flashing power not reaching generator revolving field (L406).	A. Check as follows:
	(1) Defective push-to-build-up-voltage switch (S407) (contacts stuck in open position)	(1) Momentarily connect two jumper leads across the push-to-build-up-voltage switch; one lead across the terminals on the left side and the other lead across the terminals on the right side. If the voltage builds up, replace switch.
	(2) Defective diode (CR401)	(2) Use ohmmeter to check diode on back of push-to-build-up-voltage switch. Replace diode if defective.
	(3) Excessive brush wear, or poor contact of brushes to slip rings.	(3) Check brushes closely for excessive wear and check brush contact with slip rings. Replace brushes if excessively worn, and make sure that brush contact with slip rings is proper.
	B. Voltage sensing relay (K406) defective. Relay contact 1-7 or 3-9 stuck in open position.	B. Connect a jumper lead between pins 1 and 3 on voltage sensing relay (5, Fig. 3). If voltage then builds up when switch S407 is pushed, voltage sensing relay is defective and must be replaced. If voltage sensing relay is good, proceed to Step C.

TROUBLE, SYMPTOM AND CONDITION	PROBABLE CAUSE	TEST, CHECK, AND REMEDY
GENERATOR AND CONTROLS (Cont'd)		
1. Generator will not build up voltage at all when push-to-build-up voltage switch (S407) is operated. Engine running normally. (Cont'd)	C. Generator revolving field (L406) defective.	C. Locate yellow and red-orange wires on the right terminal strip at lower rear of control panel. Disconnect the yellow and red-orange wires which go down to the generator. (Refer to connection diagram 489612 in Chapter 5). Measure resistance between these two wires. Should be 6 to 8 ohms. If reading indicates an open, short or lower than normal resistance, proceed to Step D.
	D. Defective generator armature (G402)	D. If check of the generator revolving field (Step C above) revealed no trouble, the generator armature is defective. Send unit to overhaul.
2. Generator builds up to only a low voltage while push-to-build-up voltage switch is depressed.	A. Generator voltage regulator fuse (F403) blown.	A. Replace voltage regulator fuse (4, Fig. 3). Resume operation of generator set to see if problem is corrected. If not, proceed to Step B.
	B. Defective control winding rectifier	B. Check control winding rectifiers (3, Fig. 3) with an ohmmeter to see if they are good. If either rectifier is defective, replace it. If both rectifiers are good, proceed to Step C.
	C. Generator voltage regulator (VR402) defective.	C. Replace voltage regulator (1, Fig. 3).

TROUBLE, SYMPTOM AND CONDITION	PROBABLE CAUSE	TEST, CHECK, AND REMEDY
GENERATOR AND CONTROLS (Cont'd)		
3. Generator voltage builds too high a voltage.	A. Voltage sensing relay (K406) defective. Relay coil is open or contacts 1-7 and 3-9 stuck in closed position.	A. Remove voltage sensing relay (5, Fig. 3) from its socket and apply 24V DC to the coil (terminals A and B). Using an ohmmeter, check to see that contacts open and close properly. If voltage sensing relay is defective, replace it. If not, proceed to Step B.
	B. Defective voltage regulator (VR402).	B. Replace voltage regulator (2, Fig. 3) with a voltage regulator known to be good, and resume operation of generator set. If new voltage regulator produces normal operating voltage, send old voltage regulator to factory for service.
4. Load contactor will not close when contactor close switch (S408) is operated. Engine running normally voltage normal, no load applied to output cable.	CAUTION: DO NOT OPERATE THE GENERATOR SET TO DELIVER POWER TO AN AIRCRAFT WHEN ANY PROTECTIVE DEVICE OR OTHER COMPONENT IS JUMPERED.	
	A. Defective contactor close switch (S408).	A. Momentarily connect a jumper lead between terminals 4 and 5 (red and yellow-red wires) on the contactor close switch (11, Fig. 2). If the load contactor closes momentarily, replace contactor close switch.
	B. Defective load contactor (K402).	B. If load contactor (22, Fig. 1) will not close when contactor close switch is jumpered, it is likely that the contactor is defective. Replace contactor.
	C. Overvoltage relay (K403) defective.	C. Connect a jumper lead between terminals T and P on the overvoltage relay (2, Fig. 3). If contactor will now close, replace overvoltage relay.

TROUBLE, SYMPTOM AND CONDITION	PROBABLE CAUSE	TEST, CHECK, AND REMEDY
GENERATOR AND CONTROLS (Cont'd)		
5. Load contactor opens as soon as contactor close switch is released from its top (spring-loaded) position	A. Defective contactor close switch (S408).	A. Connect a jumper lead between terminals 1 and 2 (orange-red and yellow-red wires) on the contactor close switch (11, Fig. 2). If the load contactor now remains closed, replace contactor close switch.
	B. Defective resistor R406 (located in back of control panel, on right terminal strip at bottom of panel. See connection diagram 489612).	B. Using an ohmmeter, check resistor R406 for proper resistance (7.5 ohms). If an open circuit is indicated, replace resistor.
	C. Defective diode CR402.	C. This diode is also located on the right terminal strip at bottom rear of the control panel. Using an ohmmeter, check this diode for an open circuit. If diode is defective, replace it.
	D. Load contactor (K402) defective.	D. If no fault was found in steps 4A, B, and C above, the load contactor (22, Fig. 1) is defective. Replace load contactor.
6. Load contactor opens during power delivery.	A. Contactor opening could have been normal because of an overvoltage condition.	A. Resume operation and closely observe voltmeter (6, Fig. 2) for evidence of overvoltage. If contactor opens when no overvoltage condition exists, proceed to Step B.

TROUBLE, SYMPTOM AND CONDITION	PROBABLE CAUSE	TEST, CHECK, AND REMEDY
GENERATOR AND CONTROLS (Cont'd)		
6. Load contactor opens during power delivery. (cont'd)	B. Overvoltage relay (K403) defective.	B. Check overvoltage relay by operating the machine under load and gradually raising voltage at the voltage regulator (1, Fig. 3) while observing voltmeter (6, Fig. 2). Start with a low voltage (25-V DC) and gradually increase voltage until relay functions to open load contactor. If relay trips at less than 32-V DC, replace relay (2, Fig. 3) and return old relay to factory for service.
	C. Load contactor (K402) defective.	C. If no fault was found in Step B replace load contacts (22, Fig. 1).
7. Output current cannot be limited by operating current limiting potentiometer.	A. Defective current limiting potentiometer (R402)	A. Shut down engine and check current limiting potentiometer (4, Fig. 2) with an ohmmeter. To do this, disconnect plug from generator voltage regulator (1, Fig. 3) and take resistance measurements from pin 2 to pin 9 and then from pin 2 to pin 10 on the plug. For each measurement, slowly turn potentiometer through its entire range, while observing ohmmeter readings. Replace potentiometer if defective. If it isn't defective, proceed to Step B.
	B. Defective voltage regulator (VR402)	B. Replace voltage regulator with one known to be good, and then operate the generator set under sufficient load to observe current limiting. If current limiting potentiometer now controls current properly, send old voltage regulator to factory for service.

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CHAPTER 4. ILLUSTRATED PARTS LIST

SECTION 1. INTRODUCTION

1. General

The illustrated Parts List identifies, describes, and illustrates main assemblies, sub-assemblies, and detail parts of the Jet-Ex 4 Generator Sets manufactured by Hobart Brothers Company, Power Systems Division, Troy, Ohio 45373.

2. Purpose

The purpose of this list is to provide parts identification and descriptive information to maintenance and provisioning personnel for use in provisioning, requisitioning, purchasing, storing, and issuing of spare parts.

3. Arrangement

Chapter 4 is arranged as follows:

Section 1 - Introduction
Section 2 - Manufacturer's Codes
Section 3 - Parts List
Section 4 - Numerical Index

4. Explanation of Parts List

A. Contents

The parts list contains a breakdown of the equipment into groups, assemblies, subassemblies, and detail parts. All parts of the equipment are listed except:

(1) Standard hardware items (attaching parts) such as nuts, screws, washers, etc., which are available commercially.

(2) Bulk items such as wire, cable, sleeving, tubing, etc., which are also commercially available.

(3) Permanently attached parts which lose their identity by being welded, soldered, riveted, etc., to other parts, weldments, or assemblies.

B. Parts List Form

This form is divided into six columns. Beginning at the left side of the form and proceeding to the right, columns are identified as follows:

(1) "FIGURE-ITEM NO." Column

This column lists the figure number of the illustration applicable to a particular parts list and also identifies each part in the list by an item number. These item numbers also appear on the illustration. Each item number on an illustration is connected to the part to which it pertains by a leader line. Thus the figure and item numbering system ties the parts list to the illustrations and vice versa. The figure and index numbers are also used in the numerical index to assist the user in finding the illustration of a part when the part number is known.

(2) "HOBART PART NUMBER" Column

ALL part numbers appearing in this column are Hobart numbers. In all instances where the part is a purchased item, the vendor's identifying five-digit code and his part number will appear in the "NOMENCLATURE" column. Parts manufactured by Hobart reflect no vendor code or part number in the "NOMENCLATURE" column.

(3) "NOMENCLATURE" Column

The item identifying name appears in this column. The indenture method is used to indicate item relationship. Thus, components, of an assembly are listed directly below the assembly and indented one space. Vendor codes and part numbers for purchased parts are shown in this column. Hobart modification to vendor items is also noted in this column.

(4) "EFF" (Effective) Column

This column is used to indicate the applicability of parts to different models of equipment. When more than one model of equipment is covered by a parts list, there are some parts which are used on only one model. This column is used for insertion of a code letter "A", "B", etc., to indicate these parts and to identify the particular model they are used on. This column is not used in this manual, as this manual covers only one model.

Uncoded parts are usable on all models.
Parts coded "A" are usable on Specs 6854-1
Parts coded "B" are usable on Specs 6854A-1
Parts coded "C" are usable on Specs 6854A-2

(5) "UNITS PER ASSEMBLY" Column

This column indicates the quantity of parts required for an assembly or subassembly in which the part appears. This column does not necessarily reflect the total used in the complete end item.

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SECTION 2. MANUFACTURER'S CODES

1. Explanation of Manufacturer's (Vendor) Code List

The following list is a compilation of vendor codes with names and addresses for suppliers of purchased parts listed in this publication. The codes are in accordance with the Federal Supply Codes for Manufacturer's Cataloging Handbook H4-1, and are arranged in numerical order. Vendor codes are inserted in the nomenclature column of the parts list directly following the item name and description. In case a manufacturer does not have a vendor code, the name of the manufacturer will be listed in the nomenclature column.

CODE	VENDOR'S NAME AND ADDRESS
02231	Anchor Rubber Company 840 S. Patterson Blvd. Dayton, Ohio 45402
03504	Clark Equipment 324 E. Dewey Buchanan, MI 49107
04713	Motorola Inc. Semiconductor Products Div. Phoenix, Arizona 85008
05277	Westinghouse Electric Corp. Semi Conductor Div., Hill Street Youngwood, Pennsylvania 15697
07525	Blackstone Corp. 111 Allen St. Jamestown, NY 14701
08452	Westinghouse P.O. Box 300 Sykesville, MD 21784
13445	Cole-Herse 20 Old Colony Ave. Boston, MA 02127
13446	Perkins Engines, Inc. 32500 Van Born Road Wayne, MI 48184
14655	Cornell Dubilier 209 W. Central St. Natick, MA 01760

CODE	VENDOR'S NAME AND ADDRESS
15605	Eaton Corporation 4201 N. 27th St. Milwaukee, Wisconsin 53216
16476	Datcon Instrument Co. P.O. Box 128 East Petersburg, PA 17520
16764	General Motors Corp. Delco-Remy Div. 2401 Columbus Ave. P.O. Box 2439 Anderson, IN 46018
18265	Donaldson Co. P.O. Box 1299 Minneapolis, Minn 55440
24161	Gates Rubber Co. 5610 Crawfordsville Rd., Suite 2002 Speedway, IN 46224
26659	HB Instrument Co. American and Bristol St. Philadelphia, PA 19140
28478	Deltrol Controls 2745 S. 19th St. Milwaukee, WI 53215
31211	Motorola Automotive and Electronics Group 1303 E. Algonquin Road Schaumburg, IL 60196
31510	Mainline Supply Co., Inc. 905 E. Third St. Dayton, OH 45402
31695	Facet Ent. Inc. US. No. 1 Bypass South Henderson, NC 27536
33955	Teleflex, Inc. 1816 57th St. Sarasota, FL 33580
35708	Tridon Limited P.O. Box 1600 Nashville, TN 37202

CODE	VENDOR'S NAME AND ADDRESS
44655	Ohmite Mfg. Co. 3601 W. Howard St. Skokie, IL 60076
46992	Phoenix Electric 3625 N. Halstead St. Chicago, IL 60613
49234	Protecto Seal Co. 225 W. Foster Avenue Bensenville, IL 60106
51377	Kysor of Cadillac 1100 Wright St. Cadillac, MI 49601
51589	ST - SEMICON, INC. 415 N. College Ave. Bloomington, Indiana 47401
53035	Hoover-NSK Bearing Co. 3861 Research Park Drive P.O. Box 1507 Ann Arbor, MI 48106
56289	Sprague Electric Co. 87 Marshall St. No. Adams, Mass 01247
57448	Allis Chalmers Corp. 275 Ridgeway Avenue, P.O. Box 1367 Aurora, Illinois 60507
60741	Triplett Electrical Instrument Company 286 Harmon Road Bluffton, Ohio 45817
61864	TRW-Inc. United Carr Div. 31 Burlington Mall Rd. Burlington, MA 01803
70411	Anderson Brass Co. 100 S. Campbell Ave. Detroit, MI 48209
71400	Bussman Division of McGraw-Edison Company 114 Old State Rd. St. Louis, Missouri 63178

CODE	VENDOR'S NAME AND ADDRESS
74465	Hoof Products 4051 W. 51st St. Chicago, IL 60632
74559	Carling Switch Co. 505 New Park Ave. West Hartford, CT 06110
75175	K-D Lamp Co. 1910 Elm St. Cincinnati, OH 45210
76700	Nelson Muffler Corp. P.O. Box 428 Stoughton, WI 53589
77343	Potter & Brumfield, Inc. 200 Richland Creek Drive Princeton, IN 47671
78189	Illinois Tool Works Inc. St. Charles Rd. Elgin, IL 60120
78225	Stant Manufacturing Co. 1620 Columbia Ave. Connersville, IN 47331
78377	SCP Inc. 9115 George Ave. Cleveland, OH 44105
78388	Synchro-Start Products, Inc 8109 N. Lawndale Ave. P.O. Box 147 Skokie, IL 60076-9990
78940	United Air Cleaners 9705 S. Cottage Grove Ave. Chicago, IL 60628
79409	Woodhead Daniel Co. 3411 Woodhead Dr. Northbrook, IL 60062
81640	Eaton Corp. 2074 Whitfield Ave. E. Sarasota, FL 33580

CODE	VENDOR'S NAME AND ADDRESS
82445	Abex Corp. Signal-Stat Div. 1200 Commerce Ave. Union, NJ 11211
83613	Kirkhill Inc. 12021 S. Woodroof Ave. Downey, CA 90241
88136	Trombetta Corp. 1633 E. North Ave. Milwaukee, WI. 53202
91636	Curtis 34999 Curtis Blvd. Eastlake, OH 44094
94177	Modine Mfg. Co. 1500 Dekoven Ave. Racine, WI 53401
94222	Southco Inc. 210 N. Brinton Lk. Rd. Concordville, PA 19331
96152	Borg Warner Corp. 2195 S. Elwin Rd. Decatur, IL 62525
No Number	Pipe & Supplies Inc. 329 E. Poplar St. Sidney, OH 45365

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SECTION 3. PARTS LIST

1. Explanation of Parts List Arrangement

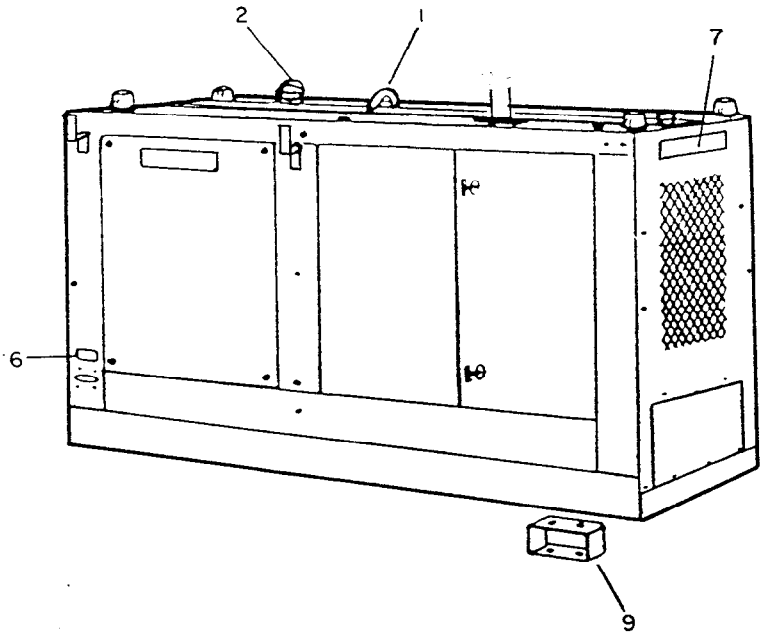
The parts list is arranged so that the illustration will appear on a left-hand page and the applicable parts list will appear on the opposite right-hand page. Unless the list is unusually long, the user will be able to look at the illustration and read the parts list without turning a page.

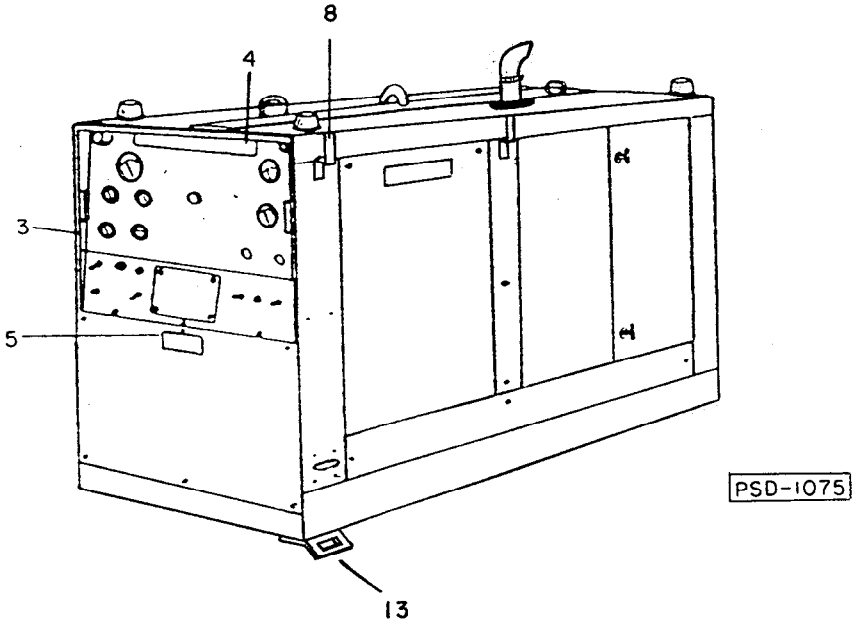
2. Symbols and Abbreviations

The following is a list of symbols and abbreviations used in the parts list.

* - item not illustrated
A, or AMP - ampere
AC - alternating current
AR - as required
DC - direct current
Fig. - Figure
hd. - head
hex - hexagon
Hz - Hertz (cycles-per-second)
I.D. - inside diameter
IN - inch
kVA - kilovolt-ampere
uF - microfarad
No. - number
NHA - next higher assembly
OM - Owners Manual
PRV - peak reverse voltage
PSI - pounds per square inch
Ref - reference (the item has been listed previously)
TM - Technical Manual
V - volt (when used as a prefix to a five-digit number, indicates vendor code)

NOTE: An item which does not reflect an index number is an assembly which is not illustrated in its assembled state, or it is similar (right-hand, left-hand, top, etc.) to an item which is illustrated.



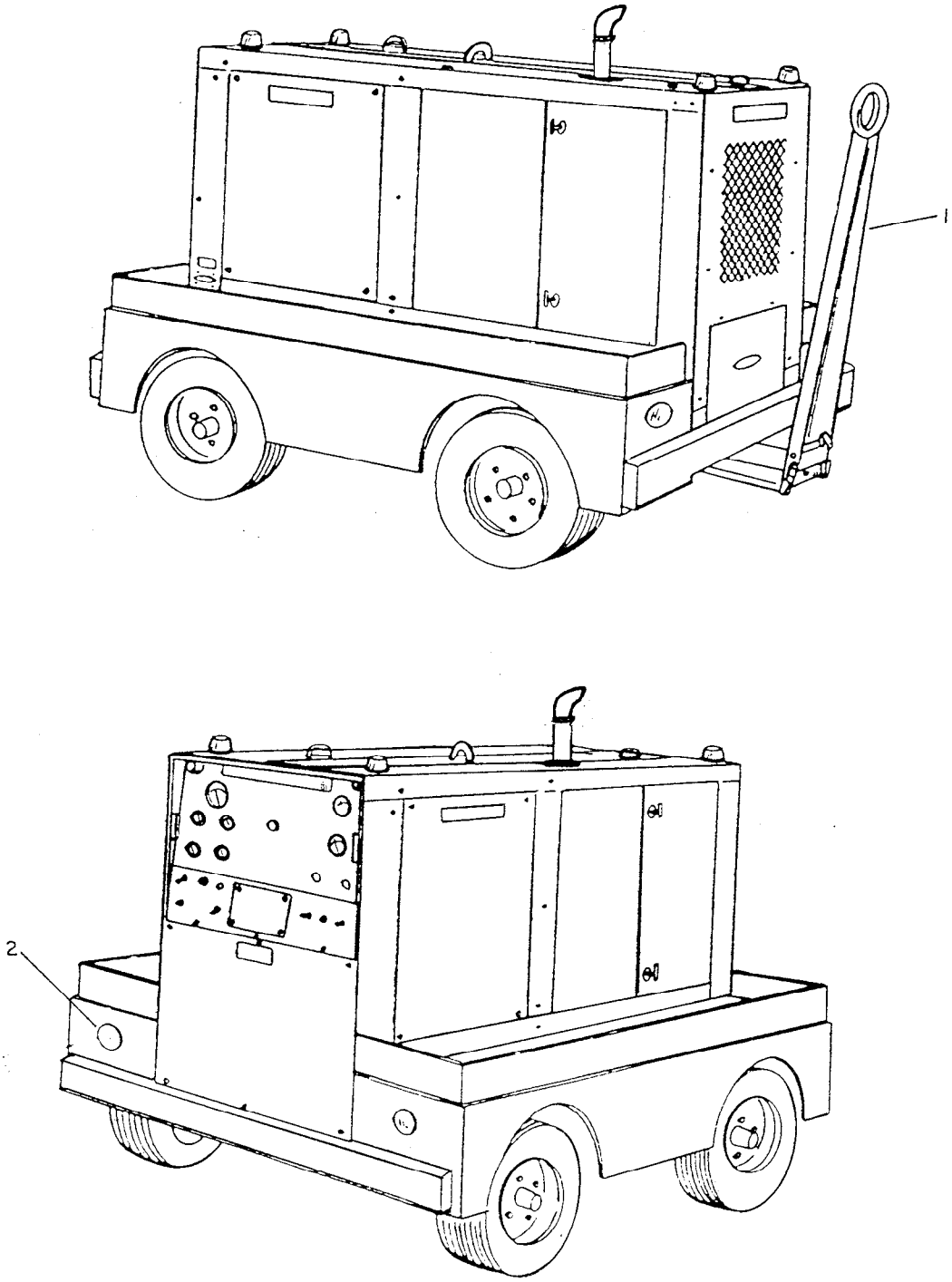


Generator Set
Stationary Mtg. Assy.
Figure 1

NOMENCLATURE

FIGURE ITEM NO.	HOBART PART NO.	1234567	UNITS per ASSY
1-	6854-1	GENERATOR SET, JET-EX 4D	1
1	489203	. YOKE, LIFTING ASSY., (For Details See Fig. 18)	1
2	76A-1152	. FUEL, CAP, V49234, NO. 1275, Type B	1
3	489263	. PANEL, CONTROL ASSY, (For Details See Fig. 6 & Fig. 7)	1
4	84B-1078	. LABEL, OPERATING INSTRUCTIONS	1
5	81B-1064	. LABEL, ENGINE DRIVE	1
6	400435	. LABEL, NAMEPLATE, 28V	1
7	402987	. NAMEPLATE, HOBART	3
8	DWP-982	. BRACKET, CABLE	2
9	488904	. BRACKET, SPACER FRAME AY.	4
*10	78A-1000	. NAMEPLATE, ID	1
*11	79A-1110	. NAMEPLATE, OPTION	1
12	489267	. CANOPY ASSY (For Details See Fig. 4)	1
*	180298	. KIT, TIE DOWN ASSY. (OPTION)	Ref
13	180297	. . BRACKET, MTG. TIE DOWN (OPTION)	4
*	W-11242-12	. . WASHER, FL.ST. 1/2 (OPTION)	8
*	W-11280-11	. . NUT, 1/2-20 HEX, JAM, ST. (OPTION)	8
*	W-11100-3	. . SCREW, 1/2-13 X 1-1/4, HHC. ST.(OPTION)	8
*	W-11254-8	. . WASHER, LK, STD. 1/2 (OPTION)	8

* Not Illustrated



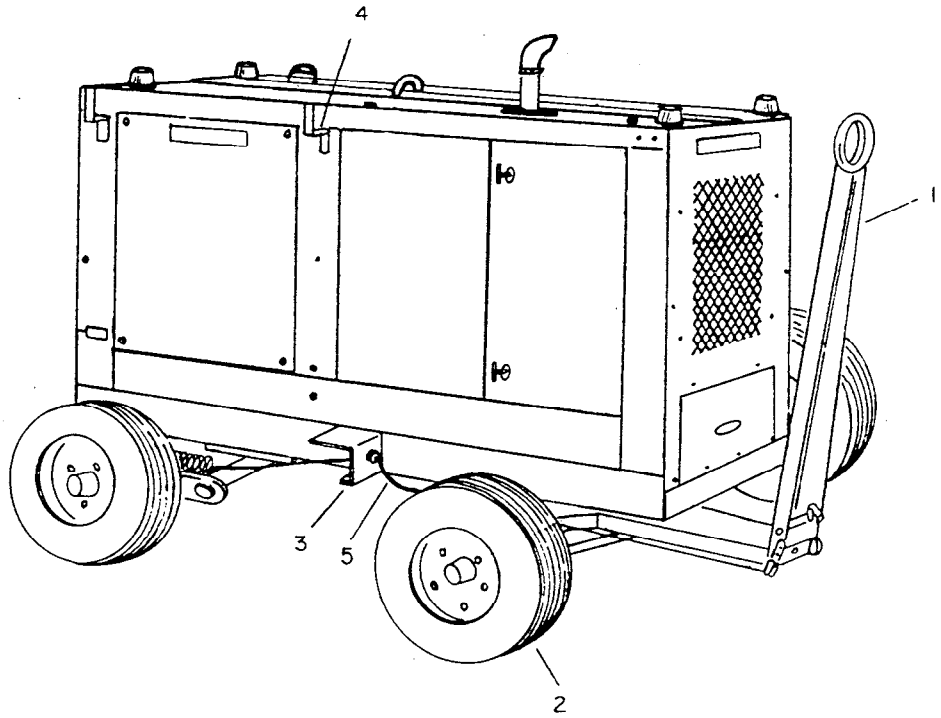
Generator Set
W/Portable Mounting and Fenders (Option)

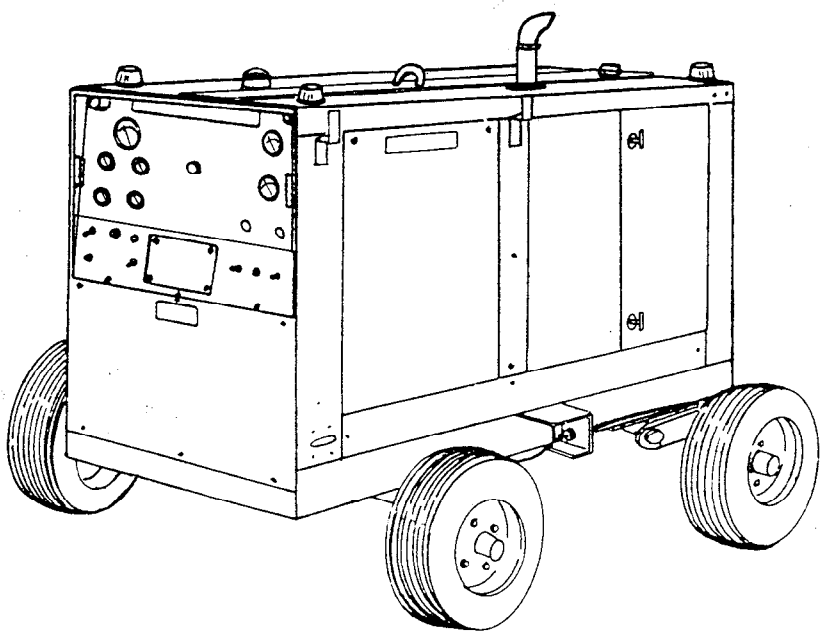
Figure 2

NOMENCLATURE

FIGURE ITEM NO.	HOBART PART NO.	1234567	EFF	UNITS per ASSY
2-	6854-1	GENERATOR SET W/ PORTABLE MTG. AND FENDERS (OPTION)	A	1
	6854A-1	GENERATOR SET W/ PORTABLE MTG. AND FENDERS (OPTION) ***	B	1
	6854A-2	GENERATOR SET, STATIONARY, W/LOW PROFILE CLEARANCE LIGHTS & RAIN SHIELD	C	1
1	488880-3	. TRAILER, ASSY, (OPTION) (For Details See Fig. 17)		1
2	84A-1054-1	. REFLECTOR, RED, V82445, NO. SAE-A-71-DOT		4

*** Series 6854A generator sets are identical in appearance, construction, and electrical operation to Series 6854 generator sets. They differ from Series 6854 generator sets in that the tachometer sending device is eliminated, a different tachometer is used, and a different brand of alternator is used. See Figures 5 and 6 for details.



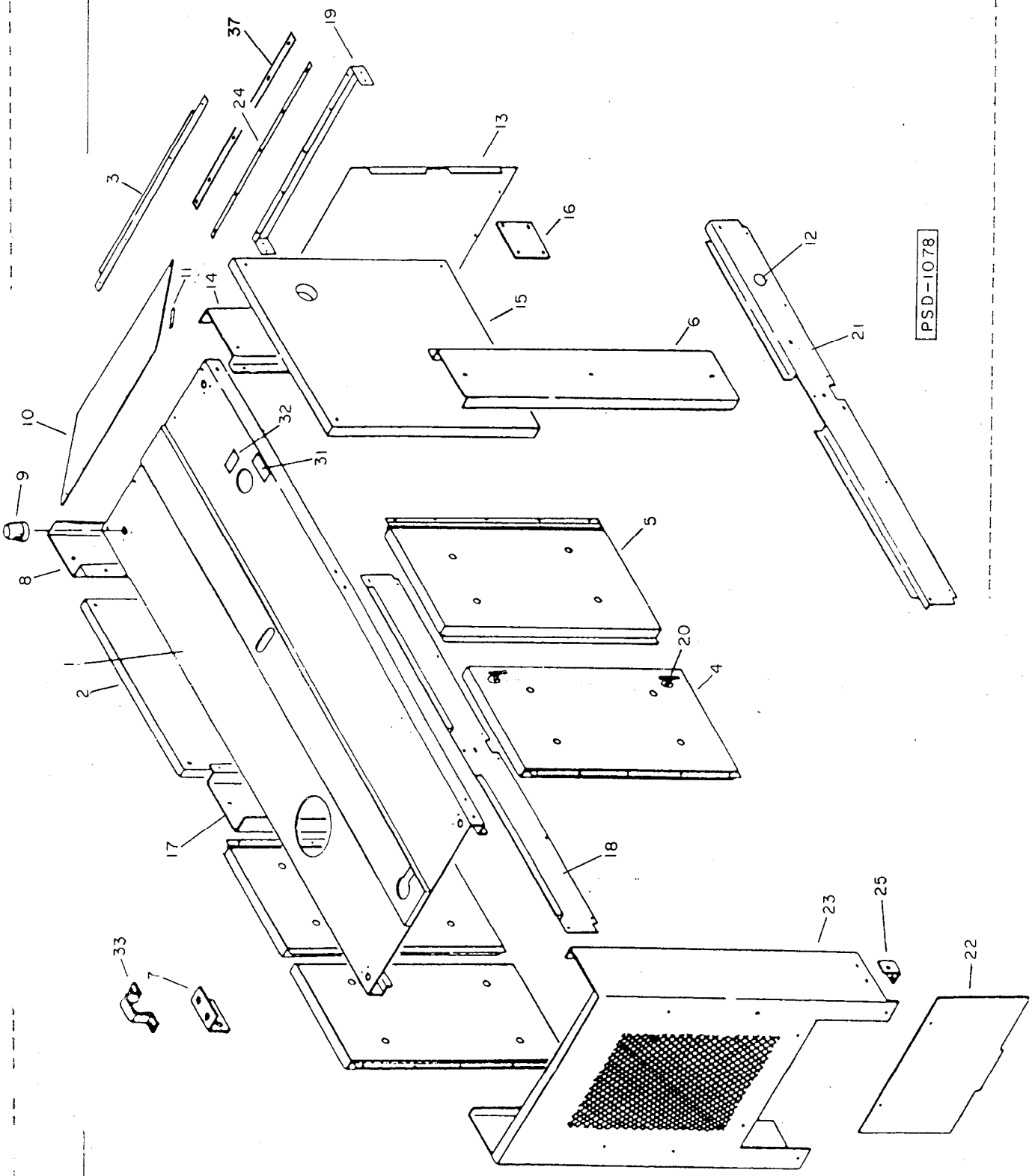


Generator Set W/Portable Mounting (Option)
Figure 3

NOMENCLATURE

FIGURE ITEM NO.	HOBART PART NO.	1234567	EFF	UNITS per ASSY
3-	6854-1	GENERATOR SET JET-EX 4D WITH PORTABLE MTG. (OPTION)	A	1
	6854A-1	GENERATOR SET JET-EX 4D WITH PORTABLE MTG. (OPTION)	B	1
	6854A-2	GENERATOR SET JET-EX 4D, STATIONARY	C	1
1	488880-4	. TRAILER ASSY., (OPTION) (For Details See Fig. 16)		1
2	84B-1099	. TIRE, 4:80 X 8, WHEEL ASSY.		4
3	488971	BRACKET, CABLE REAR BRAKE, RT. SIDE		1
4	DWP-982	BRACKET, CABLE		2
5	408432	CABLE, BRAKE ASSY. (FOR DETAILS See Fig. 16)		2
* 6	488972	BRACKET, CABLE, REAR BRAKE, LT. SIDE		1

* Not Illustrated

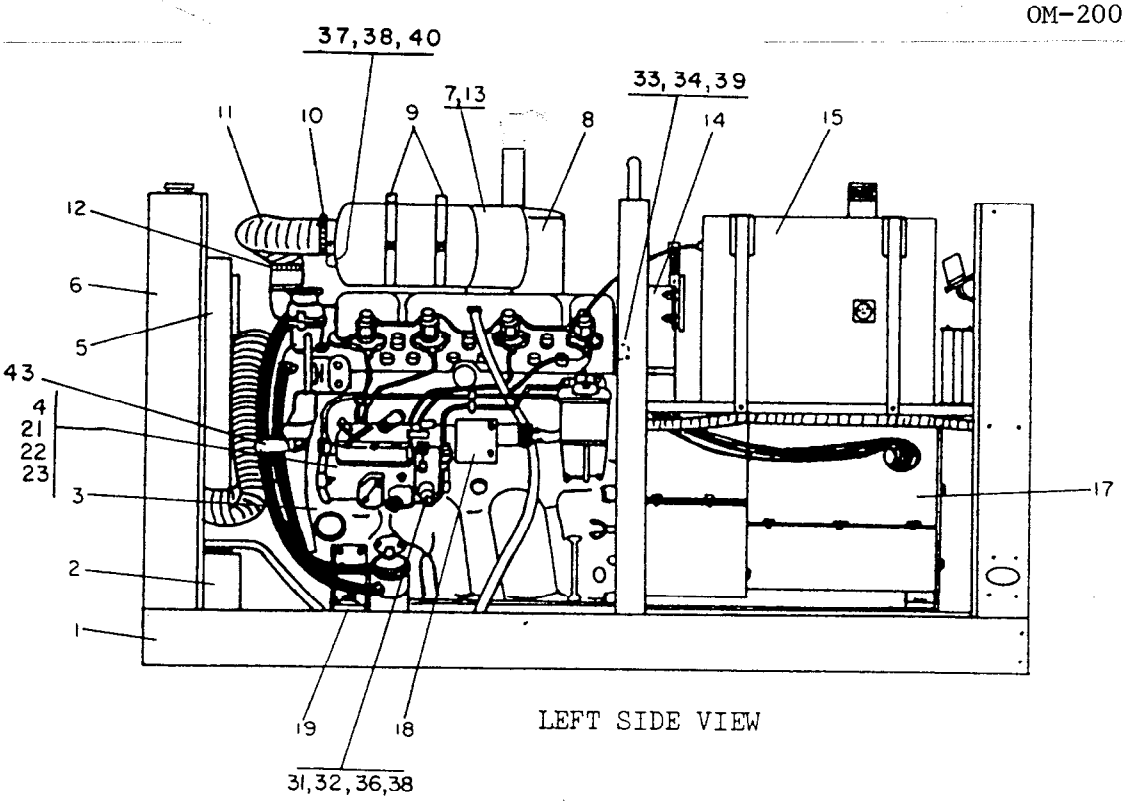


Canopy Assembly
Figure 4

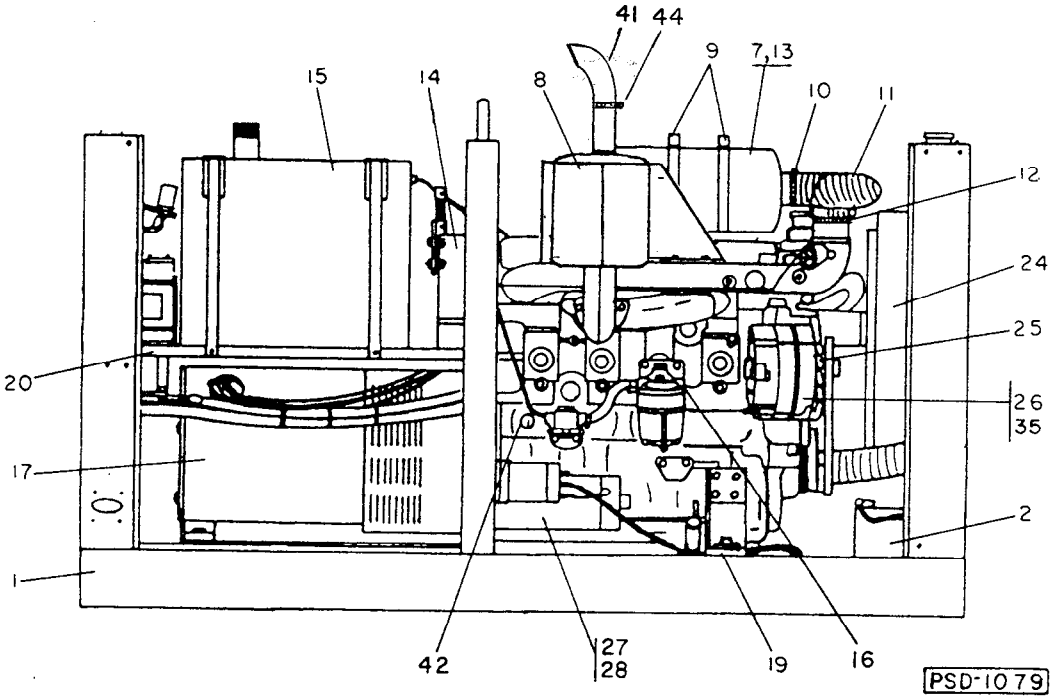
NOMENCLATURE

FIGURE ITEM NO.	HOBART PART NO.	1234567	EFF	UNITS per ASSY
4-	489267	CANOPY ASSY (FOR NHA SEE FIG. 1)		1
1	489243A	. PANEL, TOP, ASSY.	A,B	1
* 1A	181212	. PANEL, TOP, ASSY.	C	1
2	489227	. PANEL, GEN. INSULATION, ASSY.		1
3	489217	. STOP, CONTROL PANEL		1
4	489258	. DOOR, ENGINE		2
5	489259	. DOOR, ENGINE		2
6	489270	. PANEL, CENTER, LEFT, CANOPY		1
7	488640	. BRACKET, OUTPUT CABLE ASSY.		1
8	489167	. SUPPORT, CONTROL PANEL, LT. ASSY.		1
9	404101-1	. LIGHTS, CLEARANCE, V75175, NO. 514-0168	A,B	4
* 9A	408556	. LIGHTS, CLEARANCE, V75175, NO. 525-0101	C	4
	280012	. COVER, CONTROLS ASSY.		1
10	488592	. .COVER, PLEXIGLASS		1
11	181152	. .PLATE, MAGNETIC CATCH		2
	408429	. .LABEL, OPERATING INSTRUCTIONS		1
* 12	403091-9	. PLUG, HOLE, PLASTIC		1
13	489235	. PANEL, LOWER REAR		1
14	489168	. SUPPORT, CONTROL PANEL, RT ASSY.		1
15	489224	. PANEL, GEN. INSULATION RT., ASSY.		1
16	488799	. COVER, OUTPUT CABLES		1
* 17	489810	. PANEL, CENTER, RIGHT, CANOPY		1
18	489230	. PANEL, SIDE, RT, REAR ASSY.		1
19	489220	. SUPPORT, CONTROL PANEL		1
20	81B-1019	. LATCH, T-HANDLE		4
21	489229	. PANEL, SIDE, LT.		1
22	489156	. PANEL, ACCESS, BATTERY		1
23	489158	. PANEL, FRONT		1
24	489577	. SPACER, CONTROL PANEL HINGE		1
25	488633	. SUPPORT, FRONT PANEL		2
* 26	407366	. LABEL, CAUTION INSUFFICIENT COOLING		1
* 27	81B-1063	. LABEL, HOT WATER & STEAM		1
* 28	84A-1071	. LABEL, ACCESS PANEL		1
* 29	406001	. LABEL, DANGER, MOVING PART		1
* 30	402987	. NAMEPLATE, HOBART		1
31	406000	. LABEL, ENGINE FUEL		1
32	76B-1149	. LABEL, GASOLINE		1
33	7J-422-0	. CLAMP, OUTPUT CABLE		1
* 34	400435	. NAMEPLATE, 28-V		1
* 35	180015	. STRAP, BACKUP, COVER CONTROLS		1
* 36	181179	. SHIELD, RAIN, MUFFLER	C	1
37	181161	. STRAP, REINFORCING, HINGE		1

* Not Illustrated



LEFT SIDE VIEW



RIGHT SIDE VIEW

Generator Set Without Canopy
Figure 5

FIGURE ITEM NO.	HOBART PART NO.	NOMENCLATURE 1234567	EFF	UNITS per ASSY
5-	No Number	GENERATOR SET WITHOUT CANOPY (For NHA See Fig. 1)		REF
1	489151	. FRAME, MOUNTING ASSY. (For Details See Fig. 18)		1
2	402087-1	. BATTERY, 12-V (For Details See Fig 10)		2
3	408409	. ENGINE, DIESEL, V13446, TYPE 4.236		1
4	No Number	. GOVERNOR, ENGINE,		1
5	489641	. GUARD, BELT, LEFT		1
6	No Number	. COOLING SYSTEM (For Details See Fig. 13)		1
7	406651	. AIR CLEANER, V18265, NO. FWG-06-5295		1
8	408458	. MUFFLER, V76700, NO. U-49115		1
9	406538	. BRACKET, MOUNTING, AIR CLEANER V18265, NO. PPPOO-7192		2
10	W-10869-7	. CLAMP, HOSE, V35708, NO. HS-36		1
11	406974	. HOSE, AIR CLEANER		1
12	W-10869-5	. CLAMP, HOSE, V35708, NO. MH-12		1
13	408436	. FILTER, AIR CLEANER		1
14	489704	. RECTIFIER ASSEMBLY (For Details See Fig. 14)		1
15	No Number	. FUEL SYSTEM (For Details See Fig. 11)		1
16	359985	. BRACKET, FUEL FILTER		1
17	489661	. GENERATOR ASSEMBLY (For Details See Fig. 19)		1
18	489564	. FULL THROTTLE SOLENOID ASSEMBLY (For Details See Fig. 9)		1
19	489114	. SUPPORT, ENGINE, ASSY		2
*	406254-2	. MOUNT, SHOCK ENGINE (GREEN)		2
20	489554	. SUPPORT, RECTIFIER AND FUEL TANK ASSY (For Details See Fig. 7)		1
21	408442	. KIT, TACH DRIVE	A	1
22	78A-1002	. TIP, DRIVE SENDER, V33955, NO. 5933572	A	1
23	78A-1001	. SENDER, TACHOMETER, V33955, NO. 9604276	A	1
24	489639	. GUARD, BELT, RIGHT		1
25	405099	. FAN, ALTERNATOR, V16764, NO. 800612		1
26	405015	. ALTERNATOR, V16764, NO. 1105070	A	1
	405015	. ALTERNATOR, V31211, NO. 70D44220F09	B,C	1
*	181098	. BRACKET, MTG., ALTERNATOR		1
*	181099	. SPACER, ALT. BRACKET		1
*	181100	. SPACER, SCREW, ALTERNATOR		1
*	492098	. BRACKET, SUPPORT, WIRE, ALTERNATOR		1
27	407706	. MOTOR,STARTER, V16764, NO. 1998383		1

* NOT ILLUSTRATED

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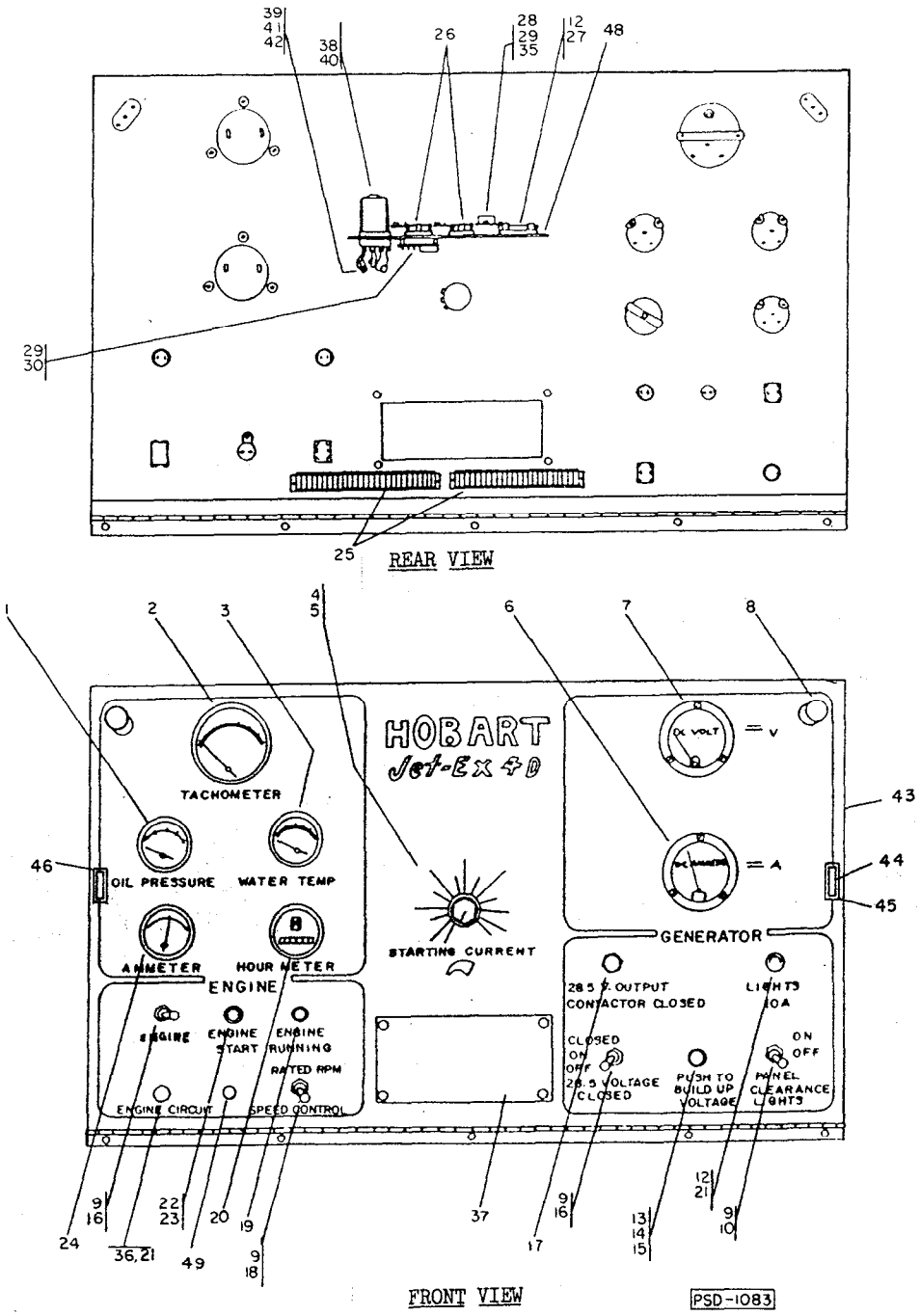
FIGURE ITEM NO.	HOBART PART NO.	NOMENCLATURE 1234567	UNITS per ASSY
5-			
* 28	DELETED		
* 29	403618-6	. BELT, FAN, V24161, No. 9002-2050	1
* 30	406149	. FAN, ENGINE, V13446, No. 31257017	1
31	403809-2	. SWITCH, OIL PRESSURE, V51377, No. C-25900-10	1
32	78B-1118-1	. SENDER, OIL PRESSURE, V16476, No. 02504	1
33	79B-1119-1	. SENDER, TEMPERATURE, V16476, No. 02019	1
34	403782-0	. SWITCH, WATER TEMPERATURE, V51377, NO. 1002-4880-33	1
35	78B-1010	. DIODE, ALTERNATOR, V72582, NO. 05100420	1
36	W-10910-0	. TEE, STREET, BRASS	1
37	W-10119-1	. COUPLING, PIPE, STEEL	1
38	W-10750-2	. NIPPLE, PIPE 1/8,	2
39	W-7814-4	. BUSHING, PIPE, STEEL	1
40	406768-1	. INDICATOR, RESTRICTION, V18265, NO. RBX00-2251	1
41	180957	. ELBOW, EXHAUST	1
42	5CW-1932-0	. DRAIN, BLOCK	1
43	80A-1117	. CLAMP, HOSE	1
44	404154-8	. CLAMP, ELBOW EXHAUST	1
* 45	W-11095-2	. BOLTS, STARTER, NYLOK	3

* Not Illustrated



Control Panel Assembly
(W/Shelf On Rear)
Figure 6

FIGURE ITEM NO.	HOBART PART NO.	NOMENCLATURE 1234567	EFF	UNITS per ASSY
6-	489263	CONTROL PANEL ASSY (FOR NHA SEE FIG. 1)		1
1	78A-1117-1	. GAUGE, OIL PRESSURE, V16476, NO. 06340		1
2	79B-1101-1	. TACHOMETER, V33955, No. 1136075	B,C	1
	408596-1	. TACHOMETER, V33955, No. 54314	A	1
3	78A-1116-1	. GAUGE, WATER TEMP., V16476, NO. 06343		1
4	16DA-2162	. KNOB, RHEOSTAT, V44655, NO. 5150		1
5	401428-1	. POTENTIOMETER, 10K OHM, 2W, V44655, NO. CMU-1031		1
6	400641-12	. AMMETER, V60741		1
7	400642-3	. VOLTMETER, DC, V60741		1
8	84B-1003	. LIGHT, PANEL, 12V, V77977, NO. 431W		2
9	406040	. BOOT, TOGGLE SWITCH, NO. H-1030A		4
10	FW-1312	. SWITCH, TOGGLE, DPST, V15605 NO. 80600-BJ		1
11		(Deleted)		
12	W-11166-3	. FUSE, AGC, 10A, V71400		2
13	Y-971	. SWITCH, PUSHBUTTON, V15605, NO. 810865NR		1
14	20RT-353-1	. DIODE, CONTROLLED AVALANCHE, V51589, NO. ST-230ECAN		1
15	25MS-156	. BUS, JUMPER		1
16	404856	. SWITCH, TOGGLE, V81640, NO. 8860K5		2
17	HF-2518-7	. LIGHT, PILOT, GREEN, 24V		1
	404172-3	. . LENS, GREEN		1
	400613-3	. . BULB		1
18	402682	. SWITCH, TOGGLE, 3PDT, V74559, NO. HLA-211-73		1
19	HF-2518-8	. LIGHT, PILOT ENGINE, GREEN, 12V		1
	404172-3	. . LENS, GREEN		1
	400613-4	. . BULB		1
20	78A-1120-1	. GAUGE, HOURMETER, V16476, NO. S6288		1
21	402658	. HOLDER, FUSE, V71400, TYPE HKP-HH		2
22	30GH-1119	. SWITCH, PUSHBUTTON		1
23	406815	. BOOT, PUSHBUTTON, SWITCH, V13445, NO. 83280		1
24	78A-1115-1	. AMMETER, V16476, NO. 06354		1
25	401937-8	. BLOCK, TERMINAL, 20A, V91636, NO. GBSY-14-TB29		2
26	404065-2	. RECTIFIER, SILICON, V04713, NO. 5DA-10270-2		2
27	W-11434	. FUSEHOLDER, V71400, NO. 4407		1
28	181022-1	. BOARD, PC REGULATOR		1
29	84A-1075	. MOUNT, RUBBER		7
30	180289	. BOARD, PC OVERVOLTAGE ASSY.		1
31	400741-13	. RESISTOR, SW, 7.5 OHM		1

* Not Illustrated

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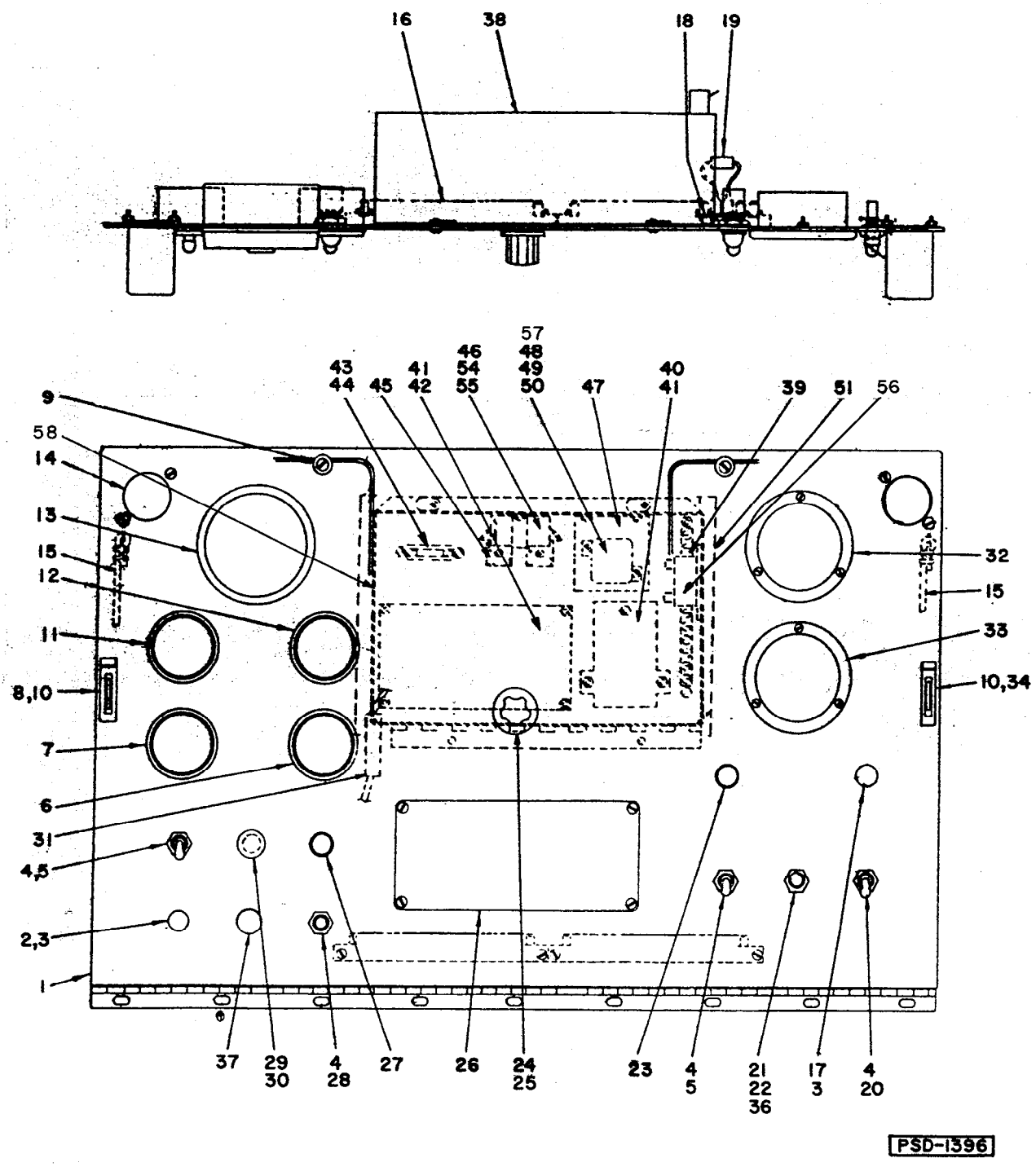
NOMENCLATURE

FIGURE ITEM NO.	HOBART PART NO.	1234567	UNITS per ASSY
6-32	1CZ-93B	. DIODE, V05277, NO. IN4820	2
* 33	41546	. INS. SLEEVING	8"
* 34	400480-2	. TERMINAL	4
35	488944	. PLUG HARNESS	1
36	W-11116-5	. FUSE, AGC, 20A, V71400	1
37	488598	. COVER, 14V OPTION	1
38	403056-4	. RELAY, ENCLOSED, DPDT, 24V DC V77343 NO. KUP-110-15-24VDC	1
39	403055-2	. SOCKET, RELAY, V77343, NO. 24E067	1
40	16DA-4253-2	. SPRING, RETAINING RELAY	
41	405485-1	. CAPACITOR, 0.1 uF, 400 VDC, V14655, NO. DPMS4P1	1
42	W-9714-25	. RESISTOR, 10 OHM, 2 WATT	1
43	489237	. PANEL, CONTROL	1
44	403127	. CATCH, MAGNETIC, DOOR, V94222, NO. 02-10-201-10	2
45	489218	. SUPPORT, MAGNET, RIGHT	1
46	489219	. SUPPORT, MAGNET, LEFT	1
* 47	389535-3	. SUPPORT, ROPE	2
48	489215	. SUPPORT, P.C. BOARD	1
49	403091-4	. PLUG, HOLE	1
* 50	180135	. HARNESS, PLUG	1
* 51	76A-115	. LATCH, ADJUSTABLE	1

* Not Illustrated



Control Panel Assembly
(W/Enclosure On Rear)
Figure 7

NOMENCLATURE

FIGURE ITEM NO.	HOBART PART NO.	1234567	EFF	UNITS per ASSY
7-	489263	CONTROL PANEL ASSY (For NHA See Fig. 1)		1
1	489237	. PANEL, CONTROL, ASSY.		1
2	W-11166-5	. FUSE, AGC, 20A, V71400		1
3	402658	. HOLDER, FUSE,V71400, TYPE HKP-HH		2
4	406040	. BOOT, TOGGLE SWITCH, No. H-1030A		4
5	404856	. SWITCH, TOGGLE, V81640, NO. 8860K5		2
6	78A-1120-1	. GAUGE, HOURMETER, V16476, NO. S6288		1
7	78A-1115-1	. AMMETER, V16476, NO. 06354		1
8	489219	. SUPPORT, MAGNET, LEFT		1
9	76A-1115	. LATCH, ADJUSTABLE GRIP		2
10	403127	. CATCH, MAGNETIC		2
11	78A-1117-1	. GAUGE, OIL PRESSURE, V16476, NO. 06340		1
12	78A-1116-1	. GAUGE, WATER TEMP., V16476, NO. 06343		1
13	408596-1	. TACHOMETER, V33955, NO. 54314	B,C	1
*13A	79B-1101-1	. TACHOMETER, V33955, No. 1136075	A	
14	84B-1003	. LIGHT, PANEL, 12V, V77977, NO. 431W		2
15	389535-3	. SUPPORT, ROPE, HINGED DOOR		2
16	401937-8	. BLOCK, TERMINAL, 20A., V91636, NO. GBSY-14-TB29		2
17	W-11166-3	. FUSE, AGC, 10A., V71400		1
18	489658-5	. DIODE, ASSY.		1
19	180591-2	. RESISTOR, 5W, ASSY.		1
20	402662	. SWITCH, TOGGLE, DPST, V74559, NO. 2GK71-73		1
21	20RT-353-1	. DIODE, CONTROLLED, AVALANCHE, V51589, NO. ST-230ECAN		1
22	25MS-156	. BUS, JUMPER		1
23	180913-2	. LIGHT, PILOT, GREEN, 28V.		1
24	16DA-2162	. KNOB, RHEOSTAT, V44655, NO. 5150		1
25	401428-1	. POTENTIOMETER, 10K OHM, 2W., V44655, NO. CMU-1031		1
26	488598	. COVER, 14V., OPTION		1
27	180913-1	. LIGHT, PILOT, ENGINE, GREEN, 12V.		1
28	402682	. SWITCH, TOGGLE, 3 PDT, V74559, NO. HLA-211-73		1
29	30GH-1119	. SWITCH, PUSHBUTTON		1
30	406815	. BOOT, PUSHBUTTON SWITCH, V13445, NO. 83280		1
31	180135	. PLUG, HARNESS		1
32	400642-3	. VOLTMETER, DC, V60741		1
33	400641-12	. AMMETER, V60741		1
34	489218	. SUPPORT, MAGNET, RIGHT		1
*35	405608	. CLIP, WIRE		2

* NOT ILLUSTRATED

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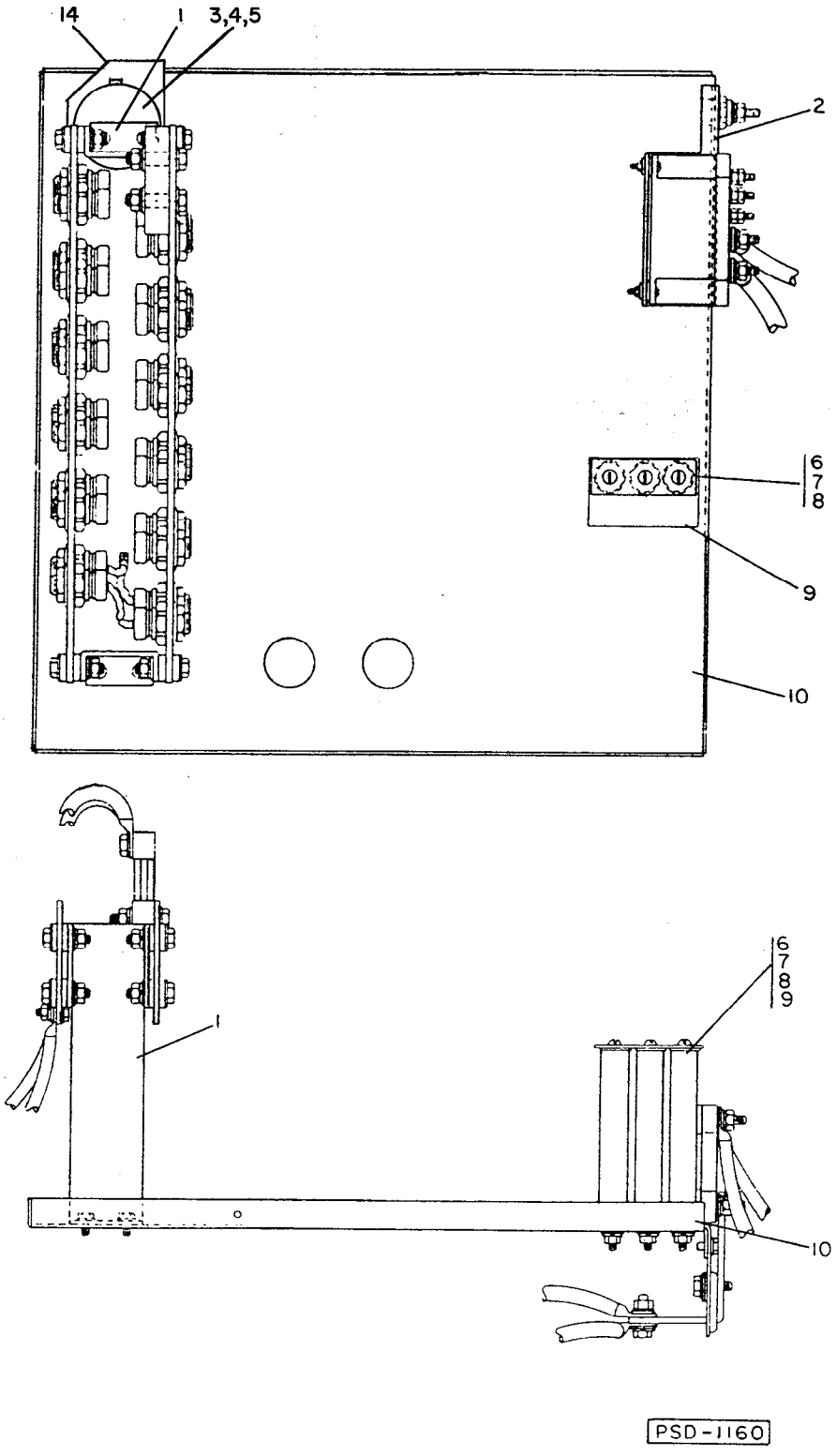
NOMENCLATURE

FIGURE ITEM NO.	HOBART PART NO.	1234567	UNITS per ASSY
7-			
36	Y-971	. SWITCH, PUSHBUTTON, V15605, NO. 810865NR	1
37	403091-5	. PLUG, HOLE, 5/8	1
38	280529	. BOX, PC BOARD, ASSY.	1
39	406003-2	. . STRIP, TERMINAL, QUICK CONNECT	1
40	180289	. . BOARD, PC, OVERVOLTAGE, ASSY.	1
41	84A-1075	. . MOUNT, RUBBER	7
42	181022-1	. . BOARD, PC, REGULATOR	1
43	W-11434	. . HOLDER, FUSE, V71400, NO. 4407	1
44	W-11166-3	. . FUSE, AGC, 10A., V71400	1
45	404065-2	. . RECTIFIER, SILICON, V04713, NO. 5DA-10270-2	2
46	W-10051-14	. . CLAMP, WIRE, PLASTIC	1
47	181039	. . BRACKET, RELAY, SOCKET, MTG.	1
48	403056-1	. . RELAY, ENCLOSED, 24V DC, V77343, NO. KUP-110-15-24VDC	1
49	403055-2	. . SOCKET, RELAY, V77343, NO. 24E067	1
50	180591-1	. . RESISTOR, 2 WATT, ASSY.	1
51	280527	. . BOX, PC, BOARD, ASSY.	1
* 52	400828-2	. . TIE, WIRE, PLASTIC	15
* 53	489658-5	. . DIODE, ASSY.	1
54	402461-5	. . CAPACITOR, 100MFD, 350VDC	1
55	402197-1	. . TERMINAL, QUICK DISCONNECT	2
56	W-4541-D	. . RESISTOR, 1000HM, 25 WATT	1
57	180593-1	. . CAPACITOR, 0.1 MFD, 400 V. DC	1
58	280686	. . INSULATOR, WALL, BOX	1

* NOT ILLUSTRATED

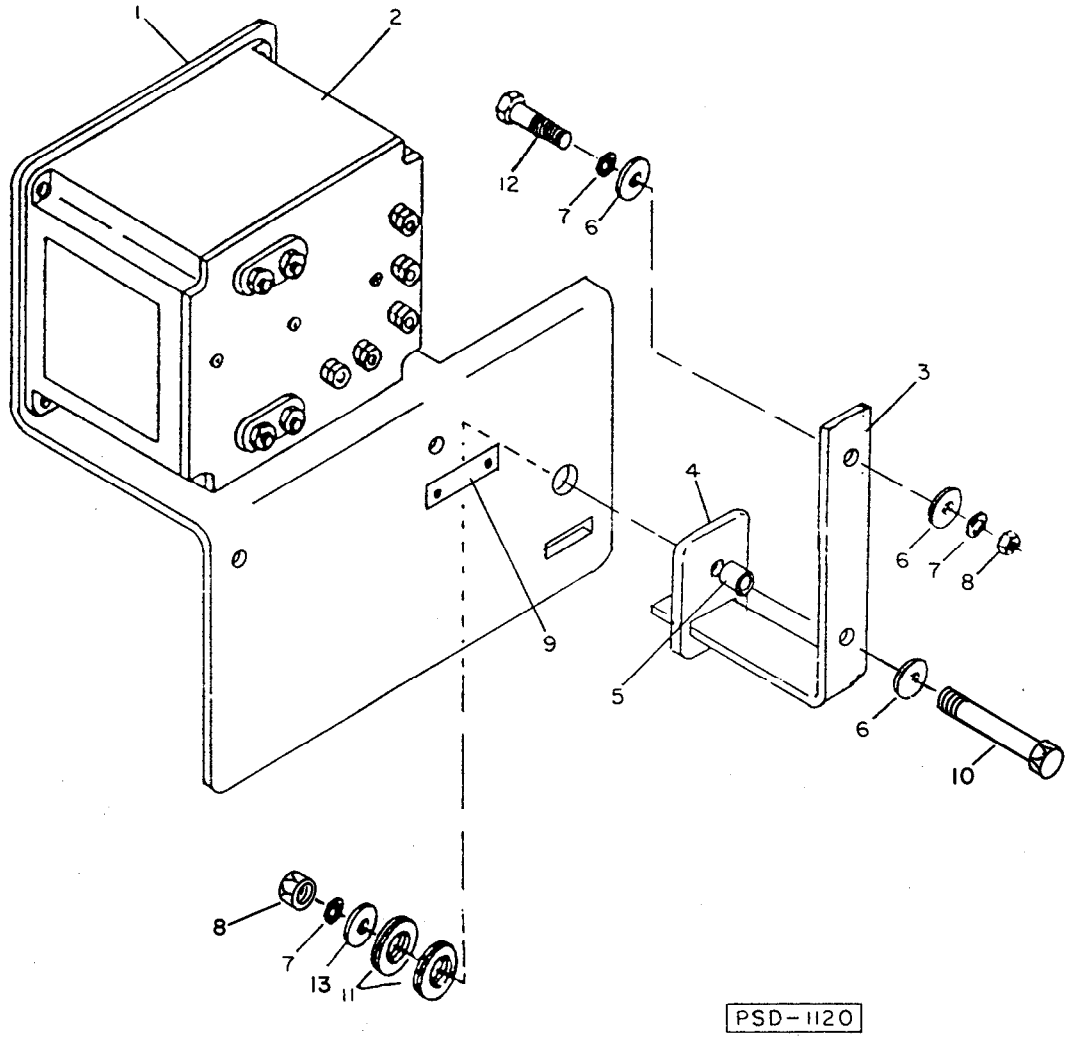


Rectifier and Fuel Tank Support Assembly
Figure 8

NOMENCLATURE

FIGURE ITEM NO.	HOBART PART NO.	1234567	UNITS per ASSY
8-	489554	SUPPORT, RECTIFIER AND FUEL TANK ASSY.	REF
1	489704	. RECTIFIER, ASSY. (For Details See Fig. 15)	1
2	489196-1	. PANEL, TERMINAL, OUTPUT, ASSY. (For Details See Fig. 9)	1
3	405278-6	. CAPACITOR, V56289, NO. 36DX413G075DF2A	1
4	361052-9	. CLAMP, MOUNTING, CAPACITOR, V56289 NO. 4586-2	1
5	350488-94	. INSULATION, CAPACITOR	1
6	W-2974-J	. RESISTOR, 10-OHM, 100W, V44655, NO. 0957	3
7	489579	. BRACKET, RESISTOR	1
8	16DA-3493	. INSULATOR, WASHER	6
9	489580	. INSULATOR, RESISTOR	1
10	489192	. SUPPORT, FUEL TANK	1
* 11	W-9218-254	. CABLE, SHUNT TO NEGATIVE OUTPUT TERMINAL (#201)	2
* 12	W-9218-255	CABLE, POSITIVE HEAT SINK TO LOAD CONTACTOR "A1" (#202	2
* 13	181159	. CLAMP, CABLE	2
14	180945	. BRACKET, MTG., CAPACITOR	1
15	181160-1	. TUBING, Z-FLEX, NEG. CABLE	2
16	181160-2	. TUBING, Z-FLEX, POS. CABLE	1

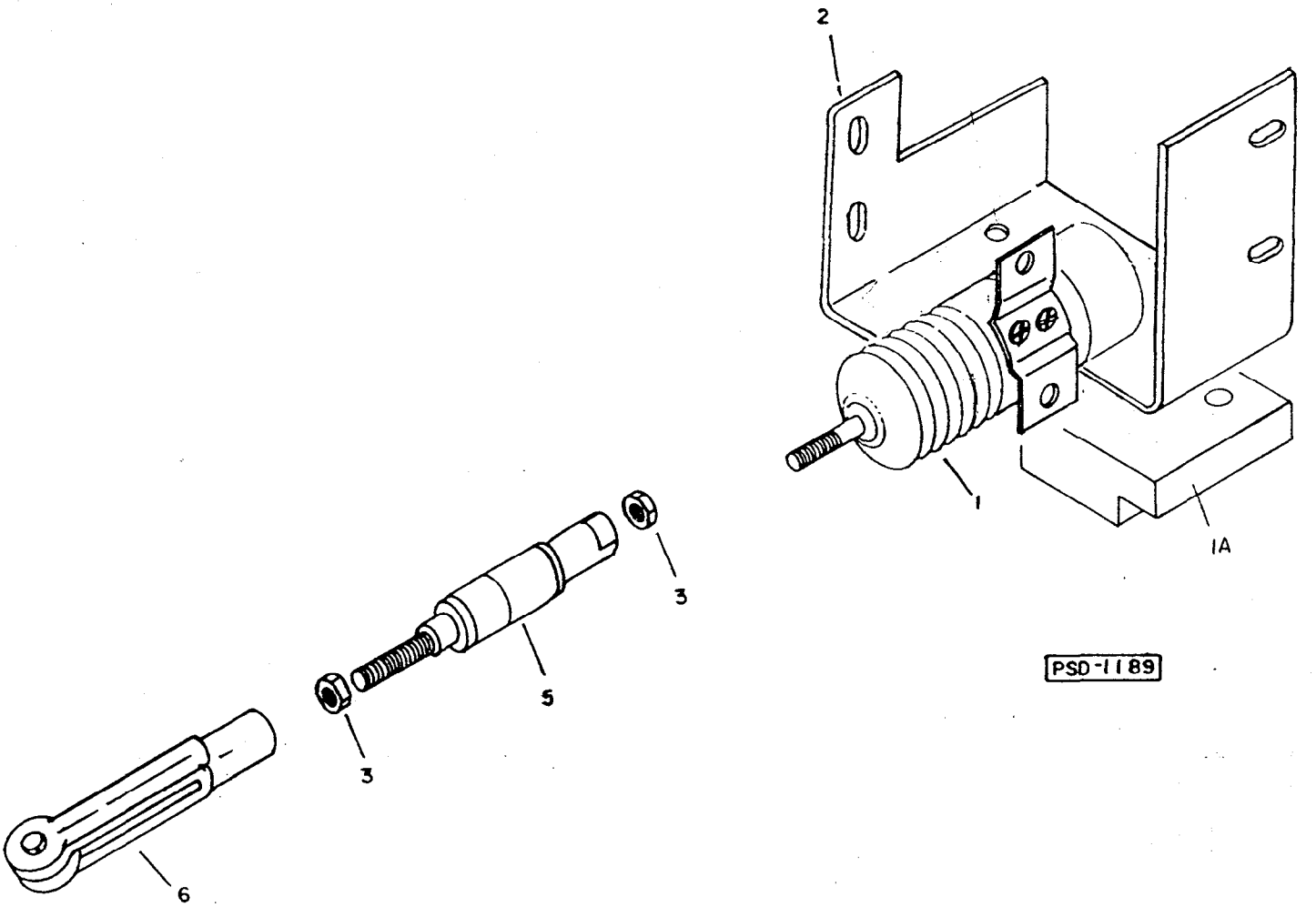
* Not Illustrated



Output Terminal Panel Assembly
Figure 9

NOMENCLATURE

FIGURE ITEM NO.	HOBART PART NO.	1234567	UNITS per ASSY
9-	489196-1	PANEL, TERMINAL, OUTPUT, ASSY. (For NHA See Fig. 8)	REF
1	489195	PANEL, OUTPUT	1
2	84C-1092	CONTACTOR, 28-V, V26659, NO. JGA6003A	1
3	489199	BUS, TERMINAL	1
4	5CW-975	BUSHING, INSULATOR	1
5	5CW-2127	BUSHING	1
6	W-11242-10	WASHER, FLAT, 3/8, ST	3
7	W-11254-6	WASHER, LOCK, 3/8, ST	4
8	W-11278-5	NUT, 3/8-16, HEX, ST	2
9	400435	NAMEPLATE, 28-V	1
10	W-11097-31	SCREW, 3/8-16 X 1-3/4, HHC, ST	1
11	5CW-976A	WASHER, INSULATOR	2
12	W-11097-3	SCREW, 3/8-16 X 1-1/4, HHC, ST	1
13	W-11242-18	WASHER, FLAT, 3/8, ST	1

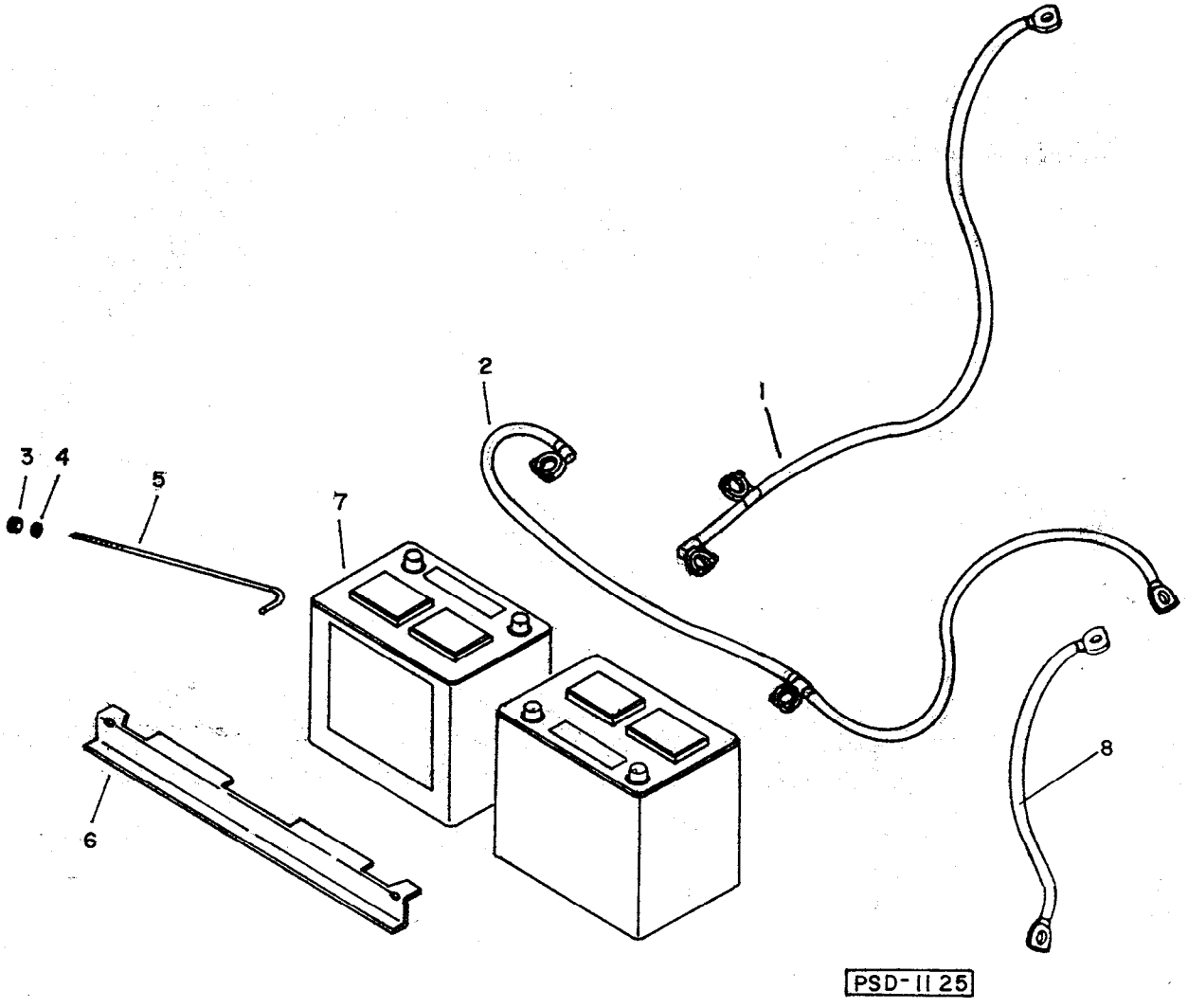


Full Throttle Solenoid Assembly
Figure 10

NOMENCLATURE

FIGURE ITEM NO.	HOBART PART NO.	1234567	UNITS per ASSY
10-	489564	THROTTLE, FULL, SOLENOID, ASSY.	REF
1	408557	. SOLENOID, V88136, ASSY, NO. P610-A1	1
1A	408559	. . MODULE, ELECTRONIC, V88136 NO.SS12-30A	1
2	180413	. SUPPORT, SOLENOID	1
3	W-11280-3	. NUT, 1/4-28, HEX FULL ST	2
4	DELETED		
5	408534	. FITTING, SWIVEL SPRING, V78388, NO. SA-3157-AB	1
6	12CW-2146	. YOKE, CLEVIS, V03504, NO. 4-J-4200	1
* 7	W-11562	. PIN, CLEVIS	1

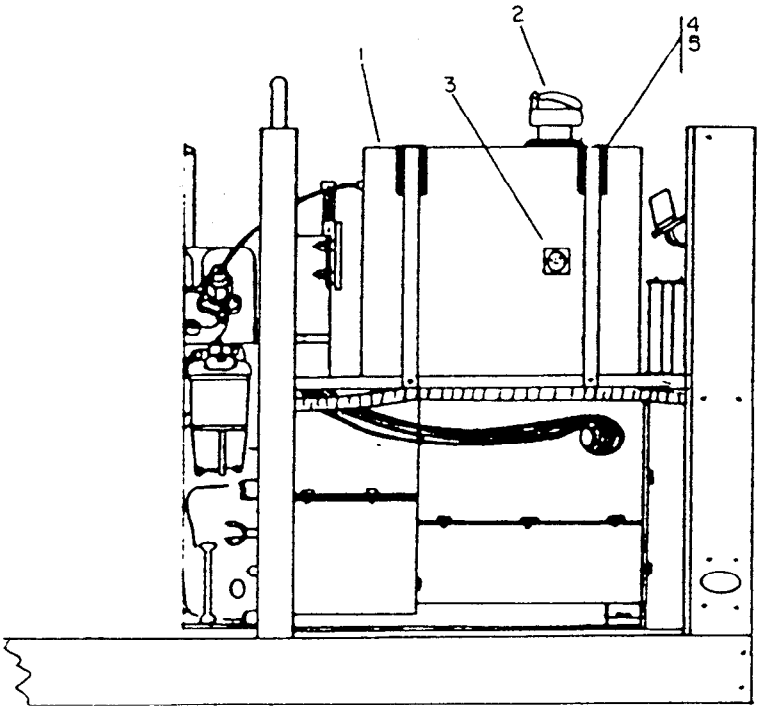
* Not Illustrated



Battery Installation
Figure 11

NOMENCLATURE

FIGURE ITEM NO.	HOBART PART NO.	1234567	UNITS per ASSY
11-	No Number	BATTERY INSTALLATION (For NHA See Fig. 5)	REF
1	180427-1	. CABLE ASSEMBLY (POS.)	1
2	491713-1	. CABLE ASSEMBLY (NEG.)	1
3	No Number	. NUT, PLAIN, HEX, 5/16-18	2
4	No Number	. WASHER, FLAT, 5/16 IN.	4
5	491687	. ROD, BATTERY CLAMP	2
6	491688-1	. CLAMP, BATTERY	1
7	402087-1	. BATTERY, 12V	2
8	W-9360-229	. CABLE, BONDING	1

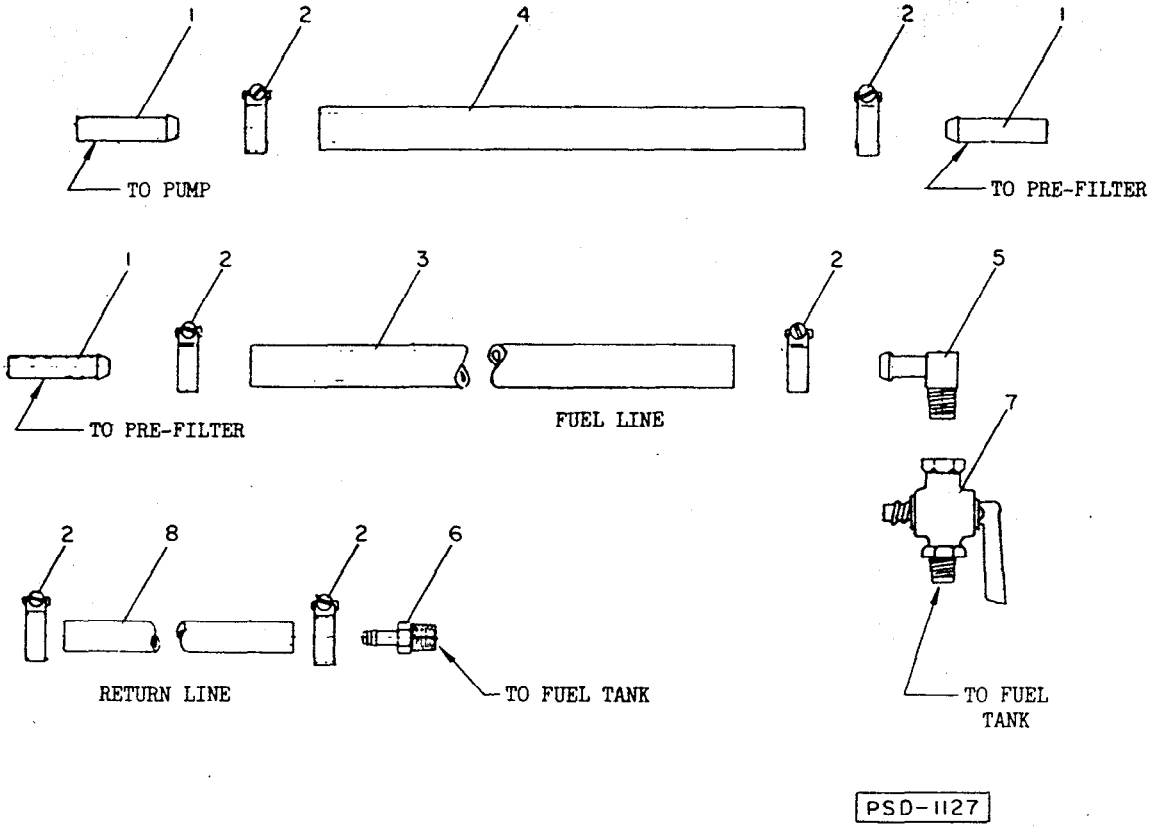


Fuel System
Figure 12

NOMENCLATURE

FIGURE ITEM NO.	HOBART PART NO.	1234567	EFF	UNITS per ASSY
12-	No Number	FUEL SYSTEM (For NHA See Fig. 5)		REF
1	489169	. TANK, FUEL ASSY.		1
2	76A-1152	. CAP, FUEL TANK, V49234, NO. 1275, Type B		1
3	5CW-3420-1	. GUAGE, FUEL TANK		1
4	486567-3	. STRAP, FUEL TANK ASSY.		2
5	483630	. INSULATION STRAP, FUEL TANK		2
* 6	489593	. LINES, FUEL & RETURN, ASSY. (For Details See Fig. 12)		1
* 7	79A-1127-2	. GUARD, FILLER NECK	C	1

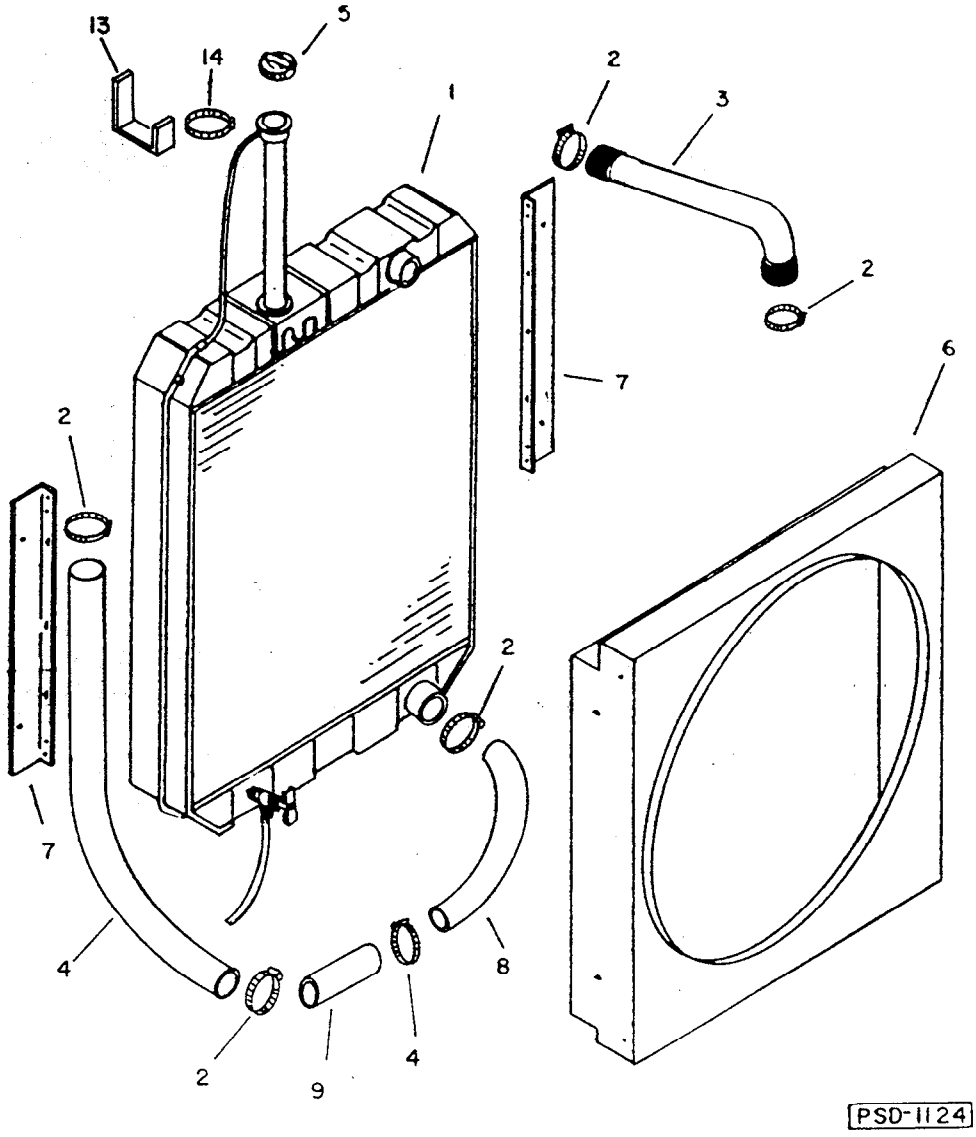
* Not Illustrated



Fuel and Return Lines Assembly
Figure 13

NOMENCLATURE

FIGURE ITEM NO.	HOBART PART NO.	1234567	UNITS per ASSY
13-	489593	LINES, FUEL AND RETURN, ASSY. (For NHA See Fig. 12)	REF
1	490036	. LINE, FUEL	3
2	W-10869-14	. CLAMP, HOSE	6
3	355325-4	. HOSE, RUBBER, 36"	1
4	355325-6	. HOSE, RUBBER, 6"	1
5	405091-1	. ELBOW, MALE, BARBED	1
6	402927-1	. CONNECTOR, MALE	1
7	402265	. VALVE, SHUT-OFF, V70411, NO. 130C-J	1
8	491889-5	. HOSE, RUBBER, 15"	1

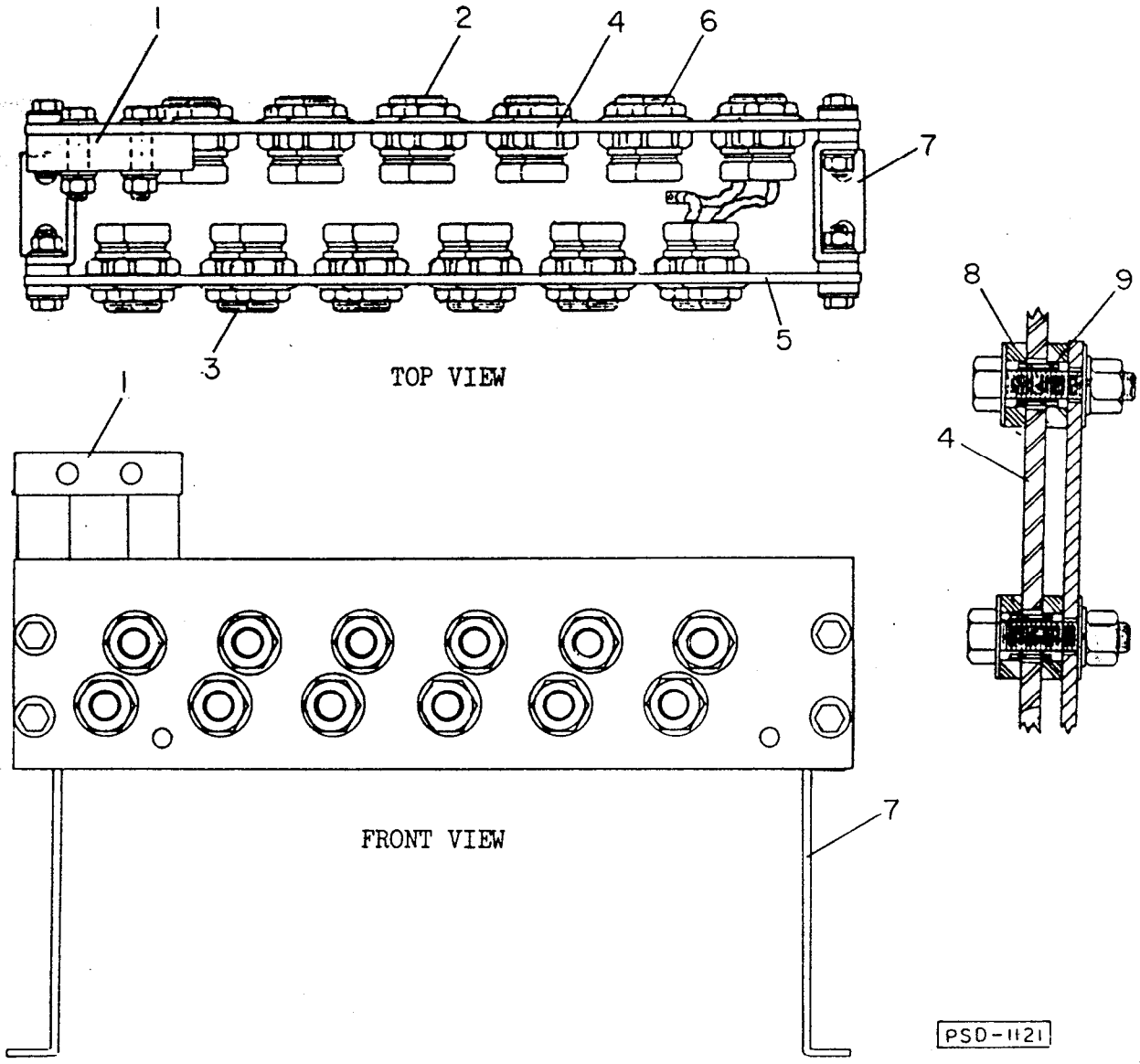


Cooling System
Figure 14

NOMENCLATURE

FIGURE ITEM NO.	HOBART PART NO.	1234567	EFF	UNITS per ASSY
14-	No Number	COOLING SYSTEM (For NHA See Fig. 5)		REF
1	408441-1	. RADIATOR, V94177, No. 1A13713D		1
2	W-10869-12	. CLAMP, V35708		6
3	406655	. HOSE, TOP, RADIATOR		1
4	405977-1	. HOSE, BOTTOM, RADIATOR		1
5	405743	. CAP, FILLER, V78225, NO. AAX-0418		1
6	489121	. SHROUD, FAN ASSY.		1
7	489122	. SUPPORT, RADIATOR		2
8	180710-1	. HOSE, BOTTOM, RADIATOR		1
9	489765	. CONNECTOR, HOSE, RADIATOR		1
*10	351541	. LABEL, CAUTION, FAN		1
*11	401842	. TAG, ATTENTION, ENGINE COOLING		1
*12	400902	. ANTI-FREEZE		1
13	489533	. SUPPORT, RADIATOR NECK		1
14	W-10869-2	. CLAMP, RADIATOR NECK		1

* Not Illustrated

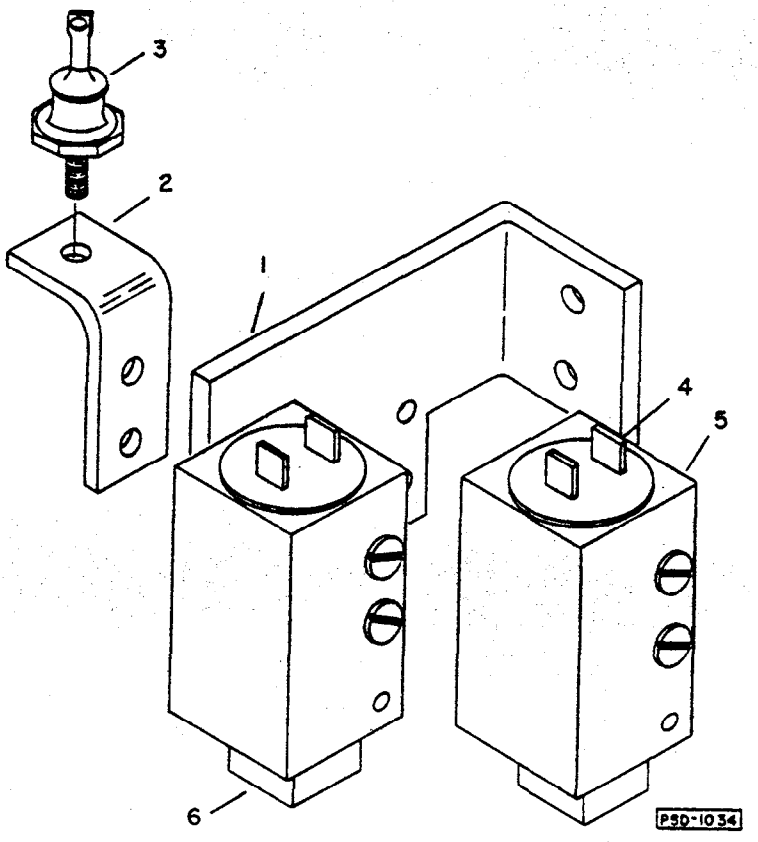


Rectifier Assembly
Figure 15

NOMENCLATURE

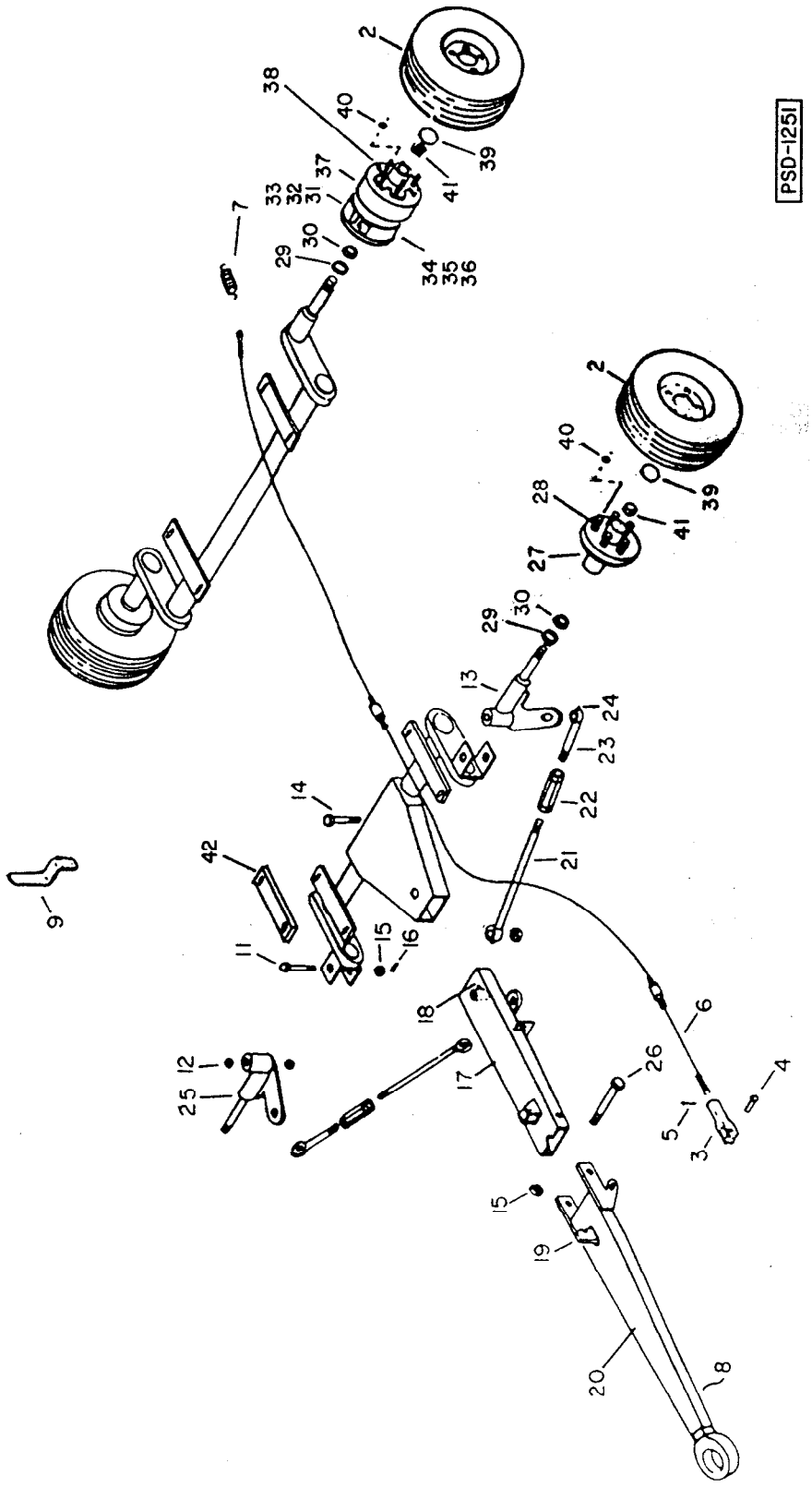
FIGURE ITEM NO.	HOBART PART NO.	1234567	UNITS per ASSY
15-	489704	RECTIFIER ASSY. (For NHA See Fig. 8)	1
1	60FC-405	. SHUNT, 2000A, 50 MV, ASSY.	1
2	W-10933-3	. RECTIFIER, SILICON CONTROLLED, V05277, NO. R6110328 (NEGATIVE BASE)	12
3	W-10931-3	. RECTIFIER, SILICON CONTROLLED, V05277, NO. R6110328 (POSITIVE BASE)	12
4	489703	. HEAT SINK, RECTIFIER, NEGATIVE	1
5	489702	. HEAT SINK, RECTIFIER, POSITIVE	1
6	400149-1	. NUT, SPRING, DISHED, 3/4-16, V78189, NO. 534-750200-52	24
7	489208	. SUPPORT, RECTIFIER	2
8	A-25	. WASHER, INSULATING, V CELCON, NO. M270-04	16
9	AW-626	. BUSHING, INSULATING	8
* 10	42543	. SLEEVING	108"

* Not Illustrated



Brushholder Assembly
Fig. 16

FIGURE ITEM NO.	HOBART PART NO.	NOMENCLATURE 1234567	UNITS per ASSY
16-	488784	BRUSHHOLDER, ASSY. (For NHA See Fig. 19)	1
1	488562	. BRACKET, MTG., BRUSHHOLDER	1
2	488628	. BRACKET, MTG, DIODE	1
3	408999-1	. DIODE, SILICON, 30A, POS.,V08452	1
4	402531	. CAP, BRUSHHOLDER, V46992, NO. DE-55	2
5	402530	. GUIDE, BRUSHHOLDER, V46992, NO. 661-D-23	2
6	402788	. BRUSH, A.C., V78377, NO. 443E	2



Kit, Trailer, Without Fenders (Option)
Figure 17

FIGURE ITEM NO.	HOBART PART NO.	NOMENCLATURE 1234567	UNITS per ASSY
17-	488880-4	KIT, TRAILER, WITHOUT FENDERS (FOR NHA SEE FIG. 3) (2360 Lb. Capacity)	1
1	84C-1100A	. TRAILER - JET EX 4D	1
2	84B-1099	. TIRE, 4:80 X 8, WHEEL ASSY. (590 Lb. Capacity)	4
	408507	. AXLE, FRONT ASSY.	1
3	12CW-2146	. YOKE, THROTTLE, ROD, V03504, NO. 4-J-4200	2
4	W-11563	. PIN, CLEVIS CLARK, V03504, NO. 4F-04051	2
5	W-11337-2	. PIN, COTTER	2
6	408432	. CABLE, BRAKE ASSY.	2
7	400562-40	. SPRING, TENSION CABLE	2
8	81B-1062	. LABEL, WARNING, DRAWBAR, (UNDERSIDE)	1
9	DWP-982	. BRACKET, CABLE	2
* 10	489272	. WASHER, FLAT, 5/8	8
11	408394	. BOLT, 3/4-16	2
12	408397	. WASHER, FL 3/4"	8
13	408387	. SPINDLE, STEERING ARM ASSY., LH	1
14	408396	. BOLT, 3/4-16 UNF X 400	1
15	408398	. NUT, SLOTTED, 3/4-16 UNF	4
16	408393	. PIN, COTTER	4
17	408388	. DRAWBAR, TUBE ASSY.	1
18	408389	. GREASE, ZURK STRAIGHT	1
19	408391	. LATCH, TONGUE ASSY.	1
20	408390	. TONGUE ASSY.	1
21	408399	. TIE ROD ASSY. LARGE	2
22	408401	. TIE ROD COUPLER ASSY	2
23	408400	. TIE ROD ASSY., SMALL	2
24	408402	. GREASE, ZURK 90	4
25	408386	. SPINDLE, STEERING ARM, ASSY. RH	1
26	408395	. BOLT, 3/4-16 UNF X 6.00	1
	408508	. AXLE, REAR ASSY.	1
27	408403	. . HUBS, 5 ON 4-1/4	2
28	408404	. . STUD, PRESS-IN, 1/2-20 X 1-7/8	10
29	408410	. GREASE, SEAL	4
30	408408	. INNER, OUTER BEARING CONE	4
		. COMPLETE BRAKE ASSY. RH (REAR WHEELS)	1
31	408413	. . ELECTRICAL BRAKE, RH 7"	1
32	408417	. . SECONDARY SHOE & LINING ASSY. (REAR WHEELS)	1
33	408418	. . PRIMARY SHOE & LINING ASSY. (REAR WHEELS)	1

* NOT ILLUSTRATED

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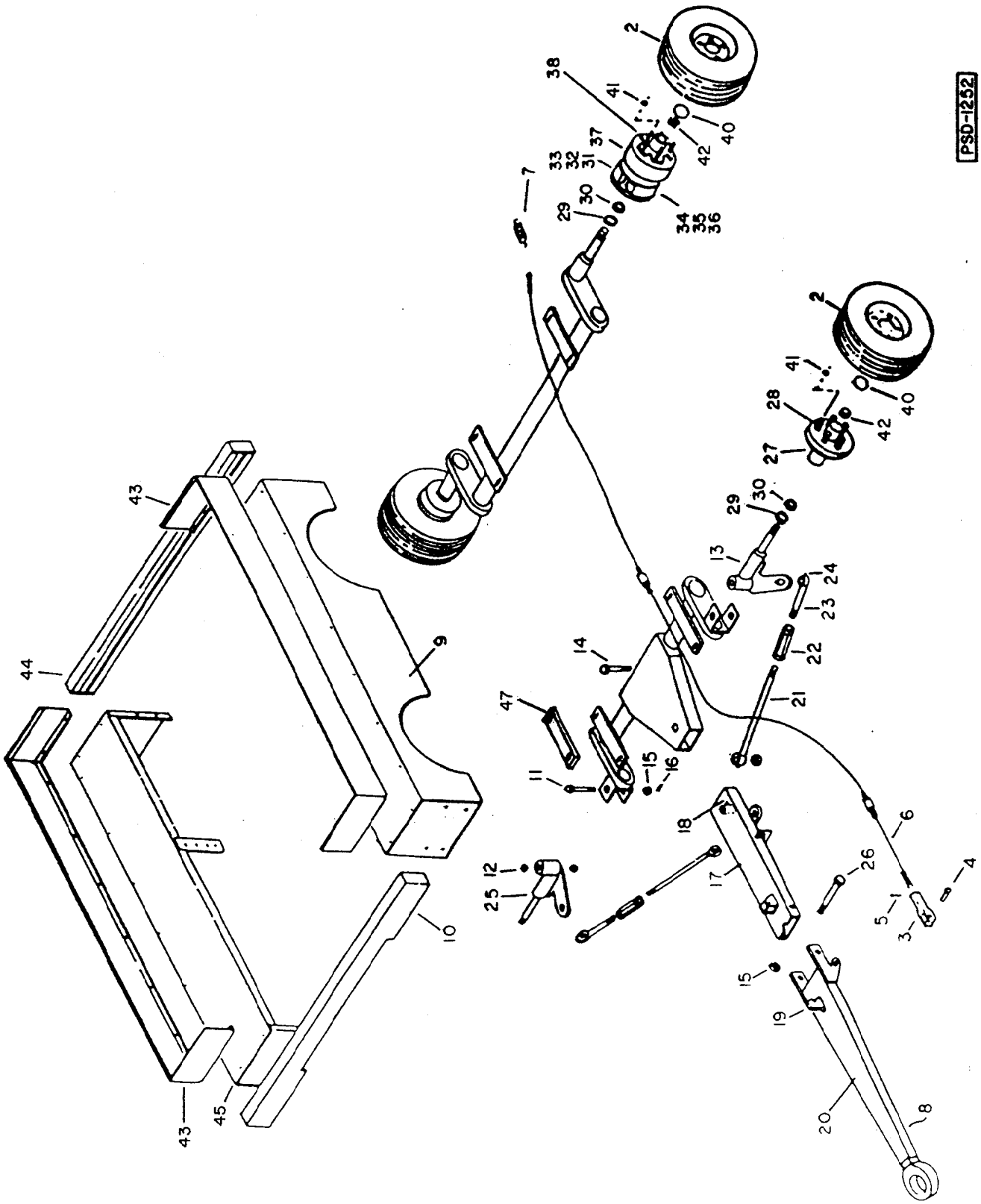
FIGURE ITEM NO.	HOBART PART NO.	NOMENCLATURE 1234567	UNITS per ASSY
17-			
		. COMPLETE BRAKE ASSY. LH (REAR WHEELS)	1
34	408414	. . ELECTRICAL BRAKE, LH (REAR WHEELS)	1
35	408417	. . SECONDARY SHOE & LINING ASSY. (REAR WHEELS)	1
36	408418	. . PRIMARY SHOE LINING ASSY. (REAR WHEELS)	1
37	408407	. HUB & DRUM W/CUPS & STUDS	2
38	408764	. . STUD, SCREW-IN, 1/2-20 X 1-3/4	10
39	408411	. COVER, DUST	4
40	408412	. NUT, WHEEL	20
41	408392	. NUT, SPINDLE	4
42	180130	. SPACER, FRONT AXLE	4



Kit, Trailer, With Fenders (Option)
Figure 18

FIGURE ITEM NO.	HOBART PART NO.	NOMENCLATURE 1234567	EFF	UNITS per ASSY
18-	488880-3	KIT, TRAILER, JET-EX 4D ASSY. (FOR NHA SEE FIG. 2) (2360 Lb. Capacity)	A	1
	488880-5	KIT, TRAILER, JET-EX 4D ASSY. (FOR NHA SEE FIG. 2) (2360 Lb. Capacity)	B,C	1
1	84C-1100A	. TRAILER - JET EX 4		1
2	84B-1099	. TIRE, 4:80 X 8, WHEEL ASSY. (590 Lb. Capacity)		4
	408507	. AXLE, FRONT ASSY.		1
3	12CW-2146	. YOKE, THROTTLE, ROD, V03504, NO. 4-J-4200		2
4	W-11563	. PIN, CLEVIS CLARK, V03504, NO. 4F-04051		2
5	W-11337-2	. PIN, COTTER		2
6	408432	. CABLE, BRAKE ASSY.		2
7	400562-40	. SPRING, TENSION CABLE		2
8	81B-1062	. LABEL, WARNING, DRAWBAR,(UNDERSIDE)		1
9	489209	. FENDER, SIDE, LEFT	A	1
*	180311	. FENDER, SIDE, LEFT	B,C	1
10	488931	. BUMPER, FRONT		1
11	408394	. BOLT, 3/4-16		2
12	408397	. WASHER, FL 3/4"		8
13	408387	. SPINDLE, STEERING ARM ASSY., LH		1
14	408396	. BOLT, 3/4-16 UNF X 400		1
15	408398	. NUT, SLOTTED, 3/4-16 UNF		4
16	408393	. PIN, COTTER		4
17	408388	. DRAWBAR, TUBE ASSY.		1
18	408389	. GREASE, ZURK STRAIGHT		1
19	408391	. LATCH, TONGUE ASSY.		1
20	408390	. TONGUE ASSY.		1
21	408399	. TIE ROD ASSY. LARGE		2
22	408401	. TIE ROD COUPLER ASSY		2
23	408400	. TIE ROD ASSY., SMALL		2
24	408402	. GREASE, ZURK 90		4
25	408386	. SPINDLE, STEERING ARM, ASSY. RH		1
26	408395	. BOLT, 3/4-16 UNF X 6.00		1
	408508	. AXLE, REAR ASSY.		1
27	408403	. . HUBS, 5 ON 4-1/4		2
28	408404	. . STUD, PRESS-IN, 1/2-20 X 1-7/8		10
29	408410	. SEAL, GREASE		4
30	408408	. INNER, OUTER BEARING CONE		4
		. COMPLETE BRAKE ASSY. LH (REAR WHEELS)		1
31	408413	. . ELECTRICAL BRAKE, LH 7"		1
32	408417	. . SECONDARY SHOE & LINING ASSY. (REAR WHEELS)		1

* NOT ILLUSTRATED

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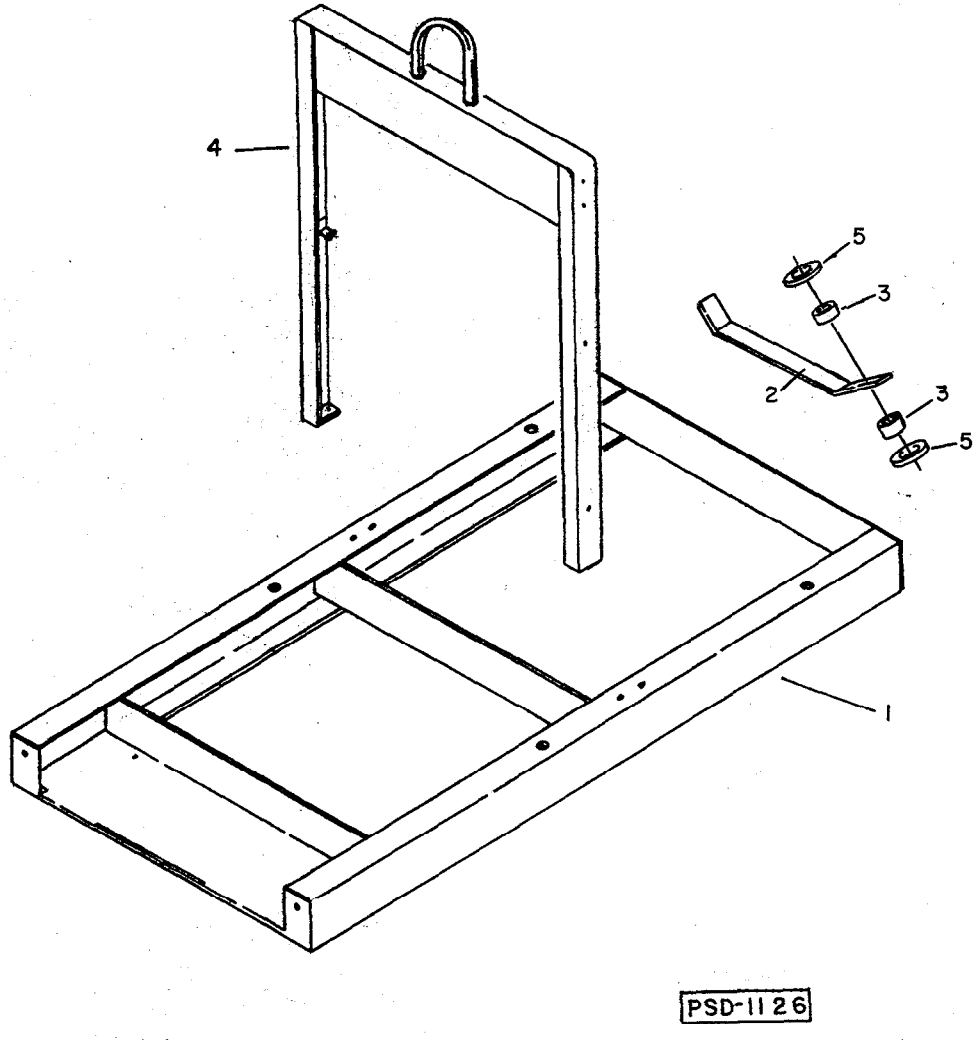
NOMENCLATURE

FIGURE ITEM NO.	HOBART PART NO.	1234567	EFF	UNITS per ASSY
18-				
33	408418	. . PRIMARY SHOE & LINING ASSY. (REAR WHEELS)		1
		. COMPLETE BRAKE ASSY. RH (REAR WHEELS)		1
34	408414	. . ELECTRICAL BRAKE, RH (REAR WHEELS)		1
35	408417	. . SECONDARY SHOE & LINING ASSY. (REAR WHEELS)		1
36	408418	. . PRIMARY SHOE & LINING ASSY. (REAR WHEELS)		1
37	408407	. HUB & DRUM W/CUPS & STUDS		2
38	408764	. . STUD, SCREW-IN, 1/2-20 X 1-3/4		10
39	DELETED			
40	408411	. COVER, DUST		4
41	408412	. NUT, WHEEL		20
42	408392	. NUT, SPINDLE		4
43	489216	. RAIL, CABLE		2
44	488930	. BUMPER, REAR		1
45	489213	. FENDER, SIDE, RIGHT	A	1
*	180310	. FENDER, SIDE, RIGHT	B,C	1
* 46	489272	. WASHER, FLAT, 5/8		8
47	180130	. SPACER, AXLE FRONT		4
* 48	180322-2	. RECEPTACLE, FORK LIFT, FRONT ASSY	B,C	1
* 49	180322-1	. RECEPTACLE, FORK LIFT, REAR ASSY.	B,C	1

* Not Illustrated

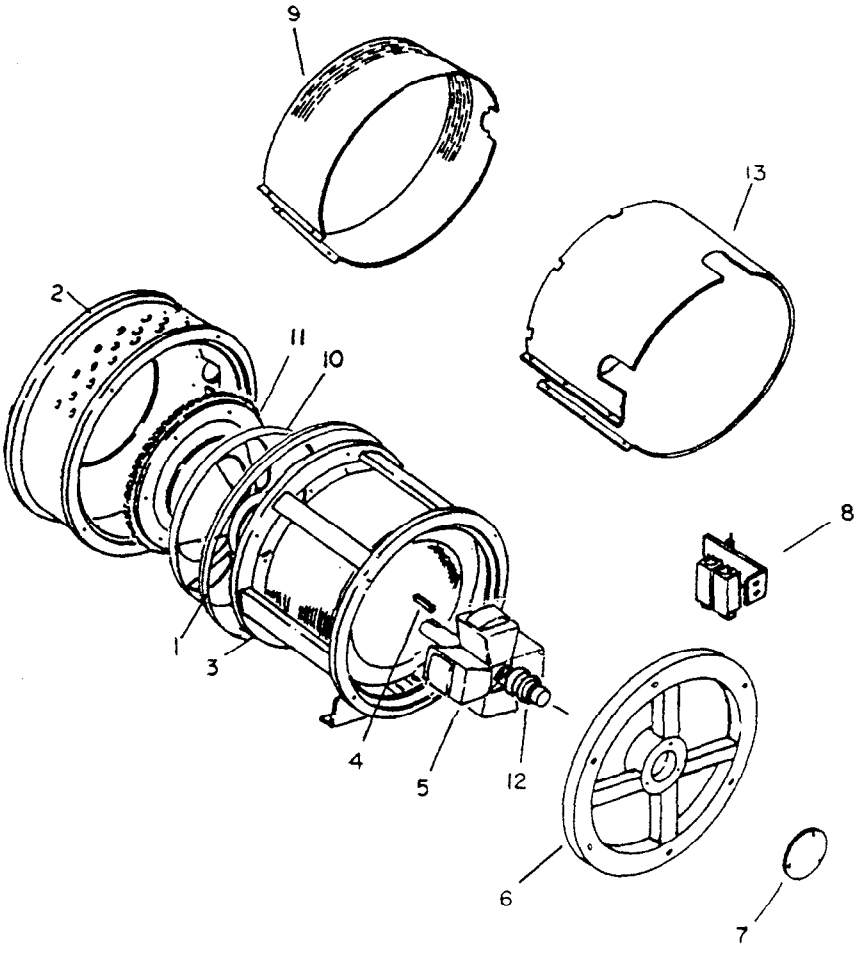


Lifting Yoke and Frame Assembly
Figure 19

NOMENCLATURE

FIGURE ITEM NO.	HOBART PART NO.	1234567	EFF	UNITS per ASSY
19-	No Number	FRAME, LIFTING YOKE ASSY. (For NHA See Fig. 1)		1
1	489151	. FRAME, MOUNTING		1
2	180543	. BAR, MTG., GENERATOR		1
3	406254-3	. MOUNT, SHOCK, GENERATOR (RED)		2
4	489203	. YOKE, LIFTING		1
5	491799	. WASHER, SHOCK MOUNT		4
	180544	. KIT, GENERATOR SUPPORT	A	1
* 6	W-11102-1	. . SCREW, 5/8-11 X 1", HHC. ST.		4
* 7	W-11254-10	. . WASHER, LOCK, 5/8, ST.		4
* 8	W-11280-12	. . NUT, HEX, 5/8-11, ST.		4
9	180542	. . SUPPORT, LEFT	A	1
10	180540	. . SUPPORT, RIGHT	A	1
* 11	406254-2	. MOUNT, SHOCK ENGINE (GREEN)		REF

* NOT ILLUSTRATED



Generator Assembly
Figure 20

NOMENCLATURE

FIGURE ITEM NO.	HOBART PART NO.	1234567	UNITS per ASSY
20-	489661	GENERATOR, ASSY.	1
1	491784	. RING, ADAPTER	1
2	489077-1	. HOUSING, FLYWHEEL	1
3	488557-2	. HOUSING & STATOR ASSY.	1
4	489135	. KEY - COUPLING	1
5	489064	. ARMATURE, ASSY.	1
6	488555-1	. HOUSING, BEARING ASSY.	1
7	5J-260-0	. CAP, BEARING	1
8	488784	. BRUSHHOLDER ASSY. (FOR DETAILS SEE FIG. 16)	1
9	489086	. COVER, FLYWHEEL HOUSING	1
10	489123	. COUPLING & FAN ASSY.	1
	* 489125	. . COUPLING, GEN. TO GEN. ASSY.	1
	* 181166	. . SCREW, CAP, HH, 3/8-24 X 1, NYLOK	8
	* W-11254-5	. . WASHER, LOCK, STD., 3/8	8
	* 85C-1004-2	. . BUSHING, SPLIT TAPER	1
11	No Num er	. FLYWHEEL - (SUPPLIED W/ENGINE)	1
12	W-10072-63	. BEARING, BALL, SINGLE ROW, RADIAL V53035, NO. 6207DDUC3E1BT3	1
13	489126	. COVER, GENERATOR HOUSING	1
14	351683	. GROMMET, LEAD HOLE	2
* 15	493384-9	. TUBE, Z-FLEX, STATOR LEAD	6
16	493384-10	. TUBE, Z-FLEX, STATOR LEAD	6

* Not Illustrated

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SECTION 4. NUMERICAL INDEX

1. Explanation of Numerical Index

The purpose of this index is to assist the user in finding the illustration and description of a part when the part number is known. Part numbers are arranged in alpha-numerical sequence. Thus, any part number beginning with the letter A would be located at or near the top of the index list. Likewise, a part number 9 would be listed near the end of the list and far below a part number 1000. The figure number and item number location of the part is directly opposite the part. If the part is used in more than one place, each location is listed commencing with the first location the part is listed.

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CHAPTER 5. OPTIONAL EQUIPMENT

Optional equipment available for use with the Jet-Ex 4D Generator Set is listed below.

OPTION	PART NUMBER	MANUAL
Henschen Trailer with Fenders, Bumpers & Cable Trays	488880-3	OM-2007
Henschen Trailer with Cable Hangers	488880-4	OM-2007
Prototype Trailer with Fenders, & Cable Trays	181000-1	TO-181
Prototype Trailer with Cable Hangers	181000-2	TO-181
Spacers, Stationary Mounting	488952	OM-2007
Kit, 14 V Output	489781	TO-168
120-V AC Generator Package (Trailer-mounted units)	489100	TO-160
120-V AC Generator Package (Stationary units and units without fenders)	489104	TO-160
Kit, Tie Down Assy. (See Fig.1)	180298	OM-2007
Trailer with Fenders, Bumpers & Cable Trays (Fork Lift Mtg.)	488880-5	OM-2007
Kit, Cold Weather Start Aid	489782	TO-167
Kit, Water Heater	180630	TO-179

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CHAPTER 6. MANUFACTURER'S LITERATURE

Perkins Users Handbook for
4.236 Series Diesel Engines

Perkins Engines, Inc.
P.O. Box 697
32500 Van Born Rd.
Wayne, Michigan 48184

Hobart Diagrams

Hobart Brothers Company
Power Systems Division
Troy, Ohio 45373

489612 - Connection, Jet-Ex 4D, Series 6854 Units

180435 - Connection, Jet-Ex 4D, Series 6854A Units

489611 - Schematic, Jet-Ex 4D, Series 6854 Units

180436 - Schematic, Jet-Ex 4D, Series 6854A Units

Printed Circuit Boards

180289 - 28 Volt Overvoltage Module

489708-1 - Voltage Regulator

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LEGEND

A401	SENDER, WATER TEMPERATURE
A402	SENDER, OIL PRESSURE
A403	SENDER, TACHOMETER
A404	MODULE, ELECTRONIC
B401	STARTER, ENGINE
BT401, BT402	BATTERY, 12 V.
C401	CAPACITOR, 41,000 MFD., 75 V.
C402	CAPACITOR, 0.1 MFD., 400 V. DC
CR401-CR403	DIODE, BLOCKING
CR405-CR416	DIODE, NEGATIVE
CR425-CR436	DIODE, POSITIVE
CR417, CR418	RECTIFIER, CONTROL WINDING
CR419, CR421, CR422	DIODE, FLYBACK
DS401, DS402	LIGHT, ILLUMINATING, WHITE
DS403-DS406	LIGHT, MARKER, AMBER
DS407	INDICATOR, ENGINE RUNNING, GREEN
DS408	INDICATOR, CONTACTOR CLOSED, GREEN
F401	FUSE, LIGHTS, 10 A.
F402	FUSE, ENGINE CIRCUIT, 20 A.
F403	FUSE, VOLTAGE REGULATOR, 10 A.
F404	FUSE, COLD WEATHER START, 15A. (WHEN FURN.)
G401	ALTERNATOR, ENGINE, 12 V.
G402	GENERATOR ARMATURE
J404, J405	RECEPTACLE, VOLTAGE REGULATOR
K402	LOAD CONTACTOR
K403	RELAY, OVERVOLTAGE
K406	RELAY, VOLTAGE SENSING
L401	SOLENOID, STARTER
L403	SOLENOID, FUEL THROTTLE
L404	SOLENOID, FUEL VALVE
L406	FIELD, REVOLVING, GENERATOR
L407	SOLENOID, VALVE, COLD WEATHER START (WHEN FURN.)
M401	AMMETER, BATTERY
M402	RUNNING TIME METER
M403	TACHOMETER
M404	GUAGE, WATER TEMPERATURE
M405	GUAGE, OIL PRESSURE
M406	VOLTMETER, GENERATOR
M407	AMMETER, GENERATOR
P404, P405	PLUG, VOLTAGE REGULATOR
R402	POTENTIOMETER, CURRENT LIMITING, 10 K. OHM, 2 W.
R403-R405	RESISTER, 10 OHM, 100 W.
R406	RESISTER, 7.5 OHM, 5 W.
R407	SHUNT, AMMETER
R409	RESISTER, 10 OHM, 2 W.
S401	SWITCH, PUSHBUTTON, ENGINE START
S402	SWITCH, WATER TEMPERATURE
S403	SWITCH, OIL PRESSURE
S404	SWITCH, ENGINE, START-RUN-STOP
S405	SWITCH, ILLUMINATING LIGHTS
S406	SWITCH, SPEED CONTROL (SHOWN IN "IDLE" POSITION)
S407	SWITCH, PUSHBUTTON, PUSH-TO-BUILD-UP-VOLTAGE
S408	SWITCH, CONTACTOR, CLOSE-ON-OFF
S411	SWITCH, ENGINE TEMP. SENSOR (WHEN FURN.)
VR402	VOLTAGE REGULATOR, GENERATOR

DWG NO 489612 SHEET 2 OF 2

② ADDED F404, L407, S411

① ADDED A404, ELECTRONIC MODULE

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PROTECTIVE FINISH						WHERE USED			ACTIVITY	M	COMM CLS
CHANGE RECORD						NEXT ASSY	NO. REQ	USED ON		REPLACED BY	REPLACES / QUANTITY/U M
No.	E.C. No.	DATE	No.	E.C. No.	DATE	S-6854	–	JET-EX 4D	MATERIAL NO	MATERIAL SPEC	
1	0357K	10 3 86	13								
2	0454K	12-22-86	14								
3			15			UNLESS OTHERWISE SPECIFIED			TITLE DIAGRAM, CONNECTION		
4			16			DIMENSIONS ARE IN INCHES/MILLIMETERS. TOLERANCES BELOW APPLY EXCEPT FOR VENDOR DESIGNED PARTS AND ITEMS PRODUCED TO RECOGNIZED STANDARDS. DO NOT SCALE DRAWING			INDEX DATA JET-EX4D		
5			17						DESIGNED DWF	DRAWN GWM	DATE 2/10/86
6			18						CHECKED DWF	DATE 3-1-86	APPROVED JRM
7			19						RECORDS AS	MFG ENGRG	M F
8			20			FRACTIONAL ± 1/64	DECIMAL - INCH .00 ± .01, .000 ± .003	METRIC 0 ± 1.0 mm, 0.0 ± 0.4 mm, 0.00 ± 0.1 mm			
9			21								
10			22								
11			23			ANGLES ± 30'	SURFACE TEXTURE				
12			24								

SCALE: BASED ON 488860

IT: H

REVISION

HOBART BROS CO TROY, OHIO 45373 U.S.A.

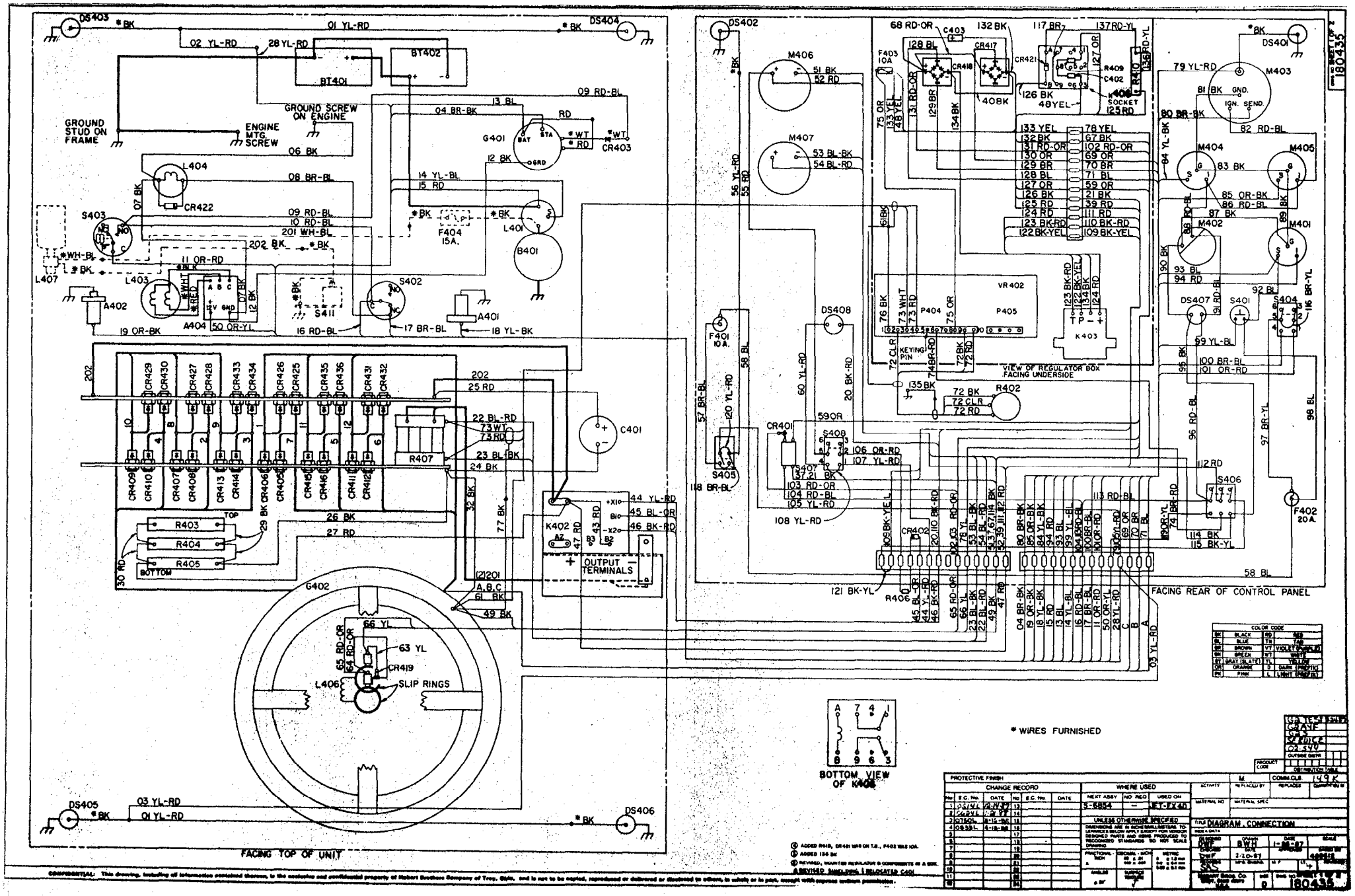
SIZE C

DWG NO 489612 SHEET 2 OF 2

PRODUCT CODE

DISTRIBUTION TABLE

GSAAF	
GSS	
SERVICE	
42-544	S Pw
OUTSIDE DISTR	


DS403
DS404
DS402
DS405
DS406
DS401
DS407
DS408
BT401
BT402
G401
G402
L401
L402
L403
L404
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L407
M401
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S411
A401
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CR401
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CR418
CR419
CR421
CR422
CR425
CR426
CR427
CR428
CR429
CR430
CR431
CR432
CR433
CR434
CR435
CR436
F401 10A.
F402 20A.
F403 10A
F404 15A.
K401
K402
K403
R402
R403
R404
R405
R406
R407
R409
R410
VR402
P404
P405
GROUND STUD ON FRAME
ENGINE MTG. SCREW
GROUND SCREW ON ENGINE
SLIP RINGS
KEYING PIN
VIEW OF REGULATOR BOX FACING UNDERSIDE
OUTPUT TERMINALS
FACING TOP OF UNIT
FACING REAR OF CONTROL PANEL
BOTTOM VIEW OF K402
SOCKET
TOP
BOTTOM
01 YL-RD
02 YL-RD
03 YL-RD
06 BK
07 BK
08 BR-BL
09 RD-BL
10 RD-BL
11 OR-RD
12 BK
13 BL
14 YL-BL
15 RD
16 RD-BL
17 BR-BL
18 YL-BK
19 OR-BK
20 WH-BL
21 BK
22 BL-RD
23 BL-BK
24 BK
25 RD
26 BK
27 RD
28 YL-RD
29 BK
30 RD
32 BK
37 BK
38 BK
39 RD
43 RD
44 YL-RD
45 BL-OR
46 BK-RD
47 RD
49 BK
50 OR-YL
51 BK
52 RD
53 BL-BK
54 BL-RD
55 RD
56 YL-RD
57 BR-BL
58 BL
59 OR
60 YL-RD
61 BK
63 YL
64 RD-OR
65 RD-OR
66 YL
67 BK
68 RD-OR
69 OR
70 BR
71 BL
72 BK
72 RD
72 CLR
73 RD
73 WHT
75 OR
76 BK
77 BK
78 YL
79 YL-RD
80 BR-BK
81 BK
82 RD-BL
83 BK
84 YL-BK
85 OR-BK
86 RD-BL
87 BK
88 RD-BL
89 BK
90 BK
91 RD-BL
92 BL
93 BL
94 RD
95 BK
96 RD-BL
97 BR-YL
98 BL
99 YL-BL
100 BR-BL
101 OR-RD
102 RD-OR
103 RD-OR
104 RD-BL
105 YL-RD
106 OR-RD
107 YL-RD
108 YL-RD
109 BK-YEL
110 BK-RD
111 RD
112 RD
113 RD-BL
114 BK
115 BK-YL
116 BR-YL
117 BR
118 BR-BL
120 YL-RD
121 BK-YL
122 BK-YEL
123 BK-RD
124 RD
125 RD
126 BK
127 OR
128 BL
129 BR
131 RD-OR
132 BK
133 YEL
134 BK
135 BK
136 RD-YL
137 RD-YL
148 BR-RD
590R
408K
406K
*WIRES FURNISHED
COLOR CODE
BLACK
BLUE
BROWN
GREEN
GRAY (SLATE)
ORANGE
PINK
RED
TAN
VIOLET (PURPLE)
WHITE
YELLOW
DARK (PRIMARY)
LIGHT (PRIMARY)
CHANGE RECORD
PROTECTIVE FINISH
WHERE USED
NEXT ASSY
NO REQ
USED ON
S-6854
JET-EX40
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCH SMALL FIGURES TO-
TOLERANCES BELOW APPLY EXCEPT FOR MEDIUM
REGROUND PARTS AND ITEMS PRODUCED TO
DRAWINGS.
FRACTIONAL
DECIMAL - INCH
METRIC
ANGLES
SURFACE TEXTURE
TITLE DIAGRAM, CONNECTION
DRAWN BWH 1-26-87
CHK'D DWF 2-10-87
APP'D
MFG
Hobart Sales Co
Troy, Ohio
SIZE D
DWG NO 180435
SHEET 1 OF 2
REV
COMM CUS
ACTIVITY
MATERIAL NO
MATERIAL SPEC
PRODUCT CODE
DISTRIBUTION CODE
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LEGEND

A401	SENDER, WATER TEMPERATURE
A402	SENDER, OIL PRESSURE
A404	MODULE, ELECTRONIC
B401	STARTER, ENGINE
BT401, BT402	BATTERY, 12 V.
C401	CAPACITOR, 41,000 MFD., 75 V.
C402	CAPACITOR, 0.1 MFD., 400 V. DC
C403	CAPACITOR, 100 MFD, 350 V. DC
CR401-CR403	DIODE, BLOCKING
CR405-CR416	DIODE, NEGATIVE
CR425-CR436	DIODE, POSITIVE
CR417, CR418	RECTIFIER, CONTROL WINDING
CR419, CR421, CR422	DIODE, FLYBACK
DS401, DS402	LIGHT, ILLUMINATING, WHITE
DS403-DS406	LIGHT, MARKER, AMBER
DS407	INDICATOR, ENGINE RUNNING, GREEN
DS408	INDICATOR, CONTACTOR CLOSED, GREEN
F401	FUSE, LIGHTS, 10 A.
F402	FUSE, ENGINE CIRCUIT, 20 A.
F403	FUSE, VOLTAGE REGULATOR, 10 A.
F404	FUSE, COLD WEATHER START, 15A. (WHEN FURN.)
G401	ALTERNATOR, ENGINE, 12 V.
G402	GENERATOR ARMATURE
J404, J405	RECEPTACLE, VOLTAGE REGULATOR
K402	LOAD CONTACTOR
K403	RELAY, OVERVOLTAGE
K406	RELAY, VOLTAGE SENSING
L401	SOLENOID, STARTER
L403	SOLENOID, FUEL THROTTLE
L404	SOLENOID, FUEL VALVE
L406	FIELD, REVOLVING, GENERATOR
L407	SOLENOID, VALVE, COLD WEATHER START (WHEN FURN.)
M401	AMMETER, BATTERY
M402	RUNNING TIME METER
M403	TACHOMETER
M404	GUAGE, WATER TEMPERATURE
M405	GUAGE, OIL PRESSURE
M406	VOLTMETER, GENERATOR
M407	AMMETER, GENERATOR
P404, P405	PLUG, VOLTAGE REGULATOR
R402	POTENTIOMETER, CURRENT LIMITING, 10 K. OHM, 2 W.
R403-R405	RESISTER, 10 OHM, 100 W.
R406	RESISTER, 7.5 OHM, 5 W.
R407	SHUNT, AMMETER
R409	RESISTER, 10 OHM, 2 W.
S401	SWITCH, PUSHBUTTON, ENGINE START
S402	SWITCH, WATER TEMPERATURE
S403	SWITCH, OIL PRESSURE
S404	SWITCH, ENGINE, START-RUN-STOP
S405	SWITCH, ILLUMINATING LIGHTS
S406	SWITCH, SPEED CONTROL (SHOWN IN "IDLE" POSITION)
S407	SWITCH, PUSHBUTTON, PUSH-TO-BUILD-UP-VOLTAGE
S408	SWITCH, CONTACTOR, CLOSE-ON-OFF
S411	SWITCH, ENGINE TEMP. SENSOR (WHEN FURN.)
VR402	VOLTAGE REGULATOR, GENERATOR

SHT 2 OF 2
180435

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NO AUF
GES
SERVICE
12-549
OUTSIDE DISTR
PRODUCT CODE
DISTRIBUTION TABLE

PROTECTIVE FINISH

CHANGE RECORD

No	E.C. No	DATE	No.	E.C. No	DATE
1	180446	1-21-88	13		
2			14		
3			15		
4			16		
5			17		
6			18		
7			19		
8			20		
9			21		
10			22		
11			23		
12			24		

WHERE USED

NEXT ASSY.	NO REQ	USED ON
S-6854	—	JET-EX4D

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES MILLIMETERS TOLERANCES BELOW APPLY EXCEPT FOR VENDOR DESIGNED PARTS AND ITEMS PRODUCED TO RECOGNIZED STANDARDS DO NOT SCALE DRAWING

FRACTIONAL - INCH	DECIMAL - INCH	METRIC
	.00 ± .01	0 ± 1.0 mm
	.000 ± .003	0.0 ± 0.4 mm
		0.00 ± 0.1 mm

ANGLES ± 30

SURFACE TEXTURE

ACTIVITY	M	COMM CLS 11
	REPLACED BY	REPLACES
MATERIAL NO	MATERIAL SPEC	QUANTITY/U/M

TITLE DIAGRAM, CONNECTION

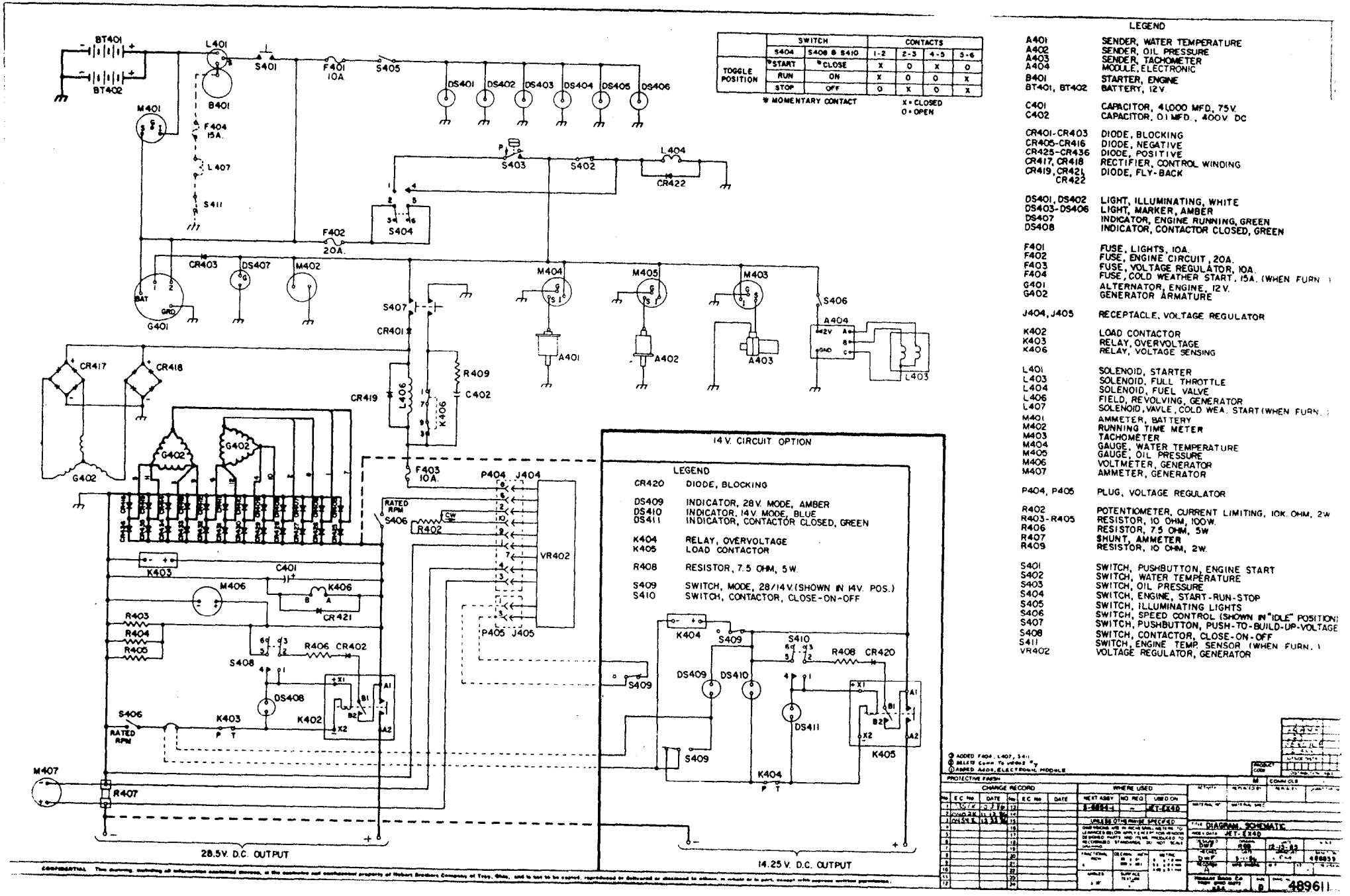
PROEX DATA JET-EX4D

DESIGNED	DRAWN	DATE	SCALE
DWF	BWH	1-26-87	
CHECKED	DATE	APPROVED	
DWF	2-20-87		
RELEASED	MFG. ENGRG	M.P.	REVISION
			H

HOBART BROS. CO. TROY, OHIO 45373 U.S.A.

SIZE C

DWG NO 180435 SHEET 2 OF 2



	SWITCH		CONTACTS			
	S404	S408 & S410	1-2	2-3	4-5	5-6
TOGGLE POSITION	*START	*CLOSE	X	O	X	O
	RUN	ON	X	O	O	X
	STOP	OFF	O	X	O	X

* MOMENTARY CONTACT

X = CLOSED
O = OPEN

LEGEND

A401	SENDER, WATER TEMPERATURE
A402	SENDER, OIL PRESSURE
A403	SENDER, TACHOMETER
A404	MODULE, ELECTRONIC
B401	STARTER, ENGINE
BT401, BT402	BATTERY, 12V.
C401	CAPACITOR, 41000 MFD, 75V.
C402	CAPACITOR, 01 MFD., 400V. DC
CR401-CR403	DIODE, BLOCKING
CR405-CR416	DIODE, NEGATIVE
CR425-CR436	DIODE, POSITIVE
CR417, CR418	RECTIFIER, CONTROL WINDING
CR419, CR421, CR422	DIODE, FLY-BACK
DS401, DS402	LIGHT, ILLUMINATING, WHITE
DS403-DS406	LIGHT, MARKER, AMBER
DS407	INDICATOR, ENGINE RUNNING, GREEN
DS408	INDICATOR, CONTACTOR CLOSED, GREEN
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F403	FUSE, VOLTAGE REGULATOR, 10A.
F404	FUSE, COLD WEATHER START, 15A. (WHEN FURN.)
G401	ALTERNATOR, ENGINE, 12V.
G402	GENERATOR ARMATURE
J404, J405	RECEPTACLE, VOLTAGE REGULATOR
K402	LOAD CONTACTOR
K403	RELAY, OVERVOLTAGE
K406	RELAY, VOLTAGE SENSING
L401	SOLENOID, STARTER
L403	SOLENOID, FULL THROTTLE
L404	SOLENOID, FUEL VALVE
L406	FIELD, REVOLVING, GENERATOR
L407	SOLENOID, VAVLE, COLD WEA. START (WHEN FURN.)
M401	AMMETER, BATTERY
M402	RUNNING TIME METER
M403	TACHOMETER
M404	GAUGE, WATER TEMPERATURE
M405	GAUGE, OIL PRESSURE
M406	VOLTMETER, GENERATOR
M407	AMMETER, GENERATOR
P404, P405	PLUG, VOLTAGE REGULATOR
R402	POTENTIOMETER, CURRENT LIMITING, 10K. OHM, 2W
R403-R405	RESISTOR, 10 OHM, 100W.
R406	RESISTOR, 7.5 OHM, 5W
R407	SHUNT, AMMETER
R409	RESISTOR, 10 OHM, 2W.
S401	SWITCH, PUSHBUTTON, ENGINE START
S402	SWITCH, WATER TEMPERATURE
S403	SWITCH, OIL PRESSURE
S404	SWITCH, ENGINE, START-RUN-STOP
S405	SWITCH, ILLUMINATING LIGHTS
S406	SWITCH, SPEED CONTROL (SHOWN IN "IDLE" POSITION)
S407	SWITCH, PUSHBUTTON, PUSH-TO-BUILD-UP-VOLTAGE
S408	SWITCH, CONTACTOR, CLOSE-ON-OFF
S411	SWITCH, ENGINE TEMP. SENSOR (WHEN FURN.)
VR402	VOLTAGE REGULATOR, GENERATOR

ADDED F404, L407, S411
DELETE Conn To Wires
ADDED A404, ELECTRONIC MODULE

PROTECTIVE FINISH

CHANGE RECORD

No.	E.C. No.	DATE	No.	E.C. No.	DATE
1	10744	3 16	13		
2	10943K	11 13	14		
3	11454K	12 22	15		
4			16		
5			17		
6			18		
7			19		
8			20		
9			21		
10			22		
11			23		
12			24		

WHERE USED

NEXT ASSY	NO REQ	USED ON
8-8854-1	-	JET-E240

UNLESS OTHERWISE SPECIFIED

TITLE DIAGRAM, SCHEMATIC

JET-E240

12-13-83

489611

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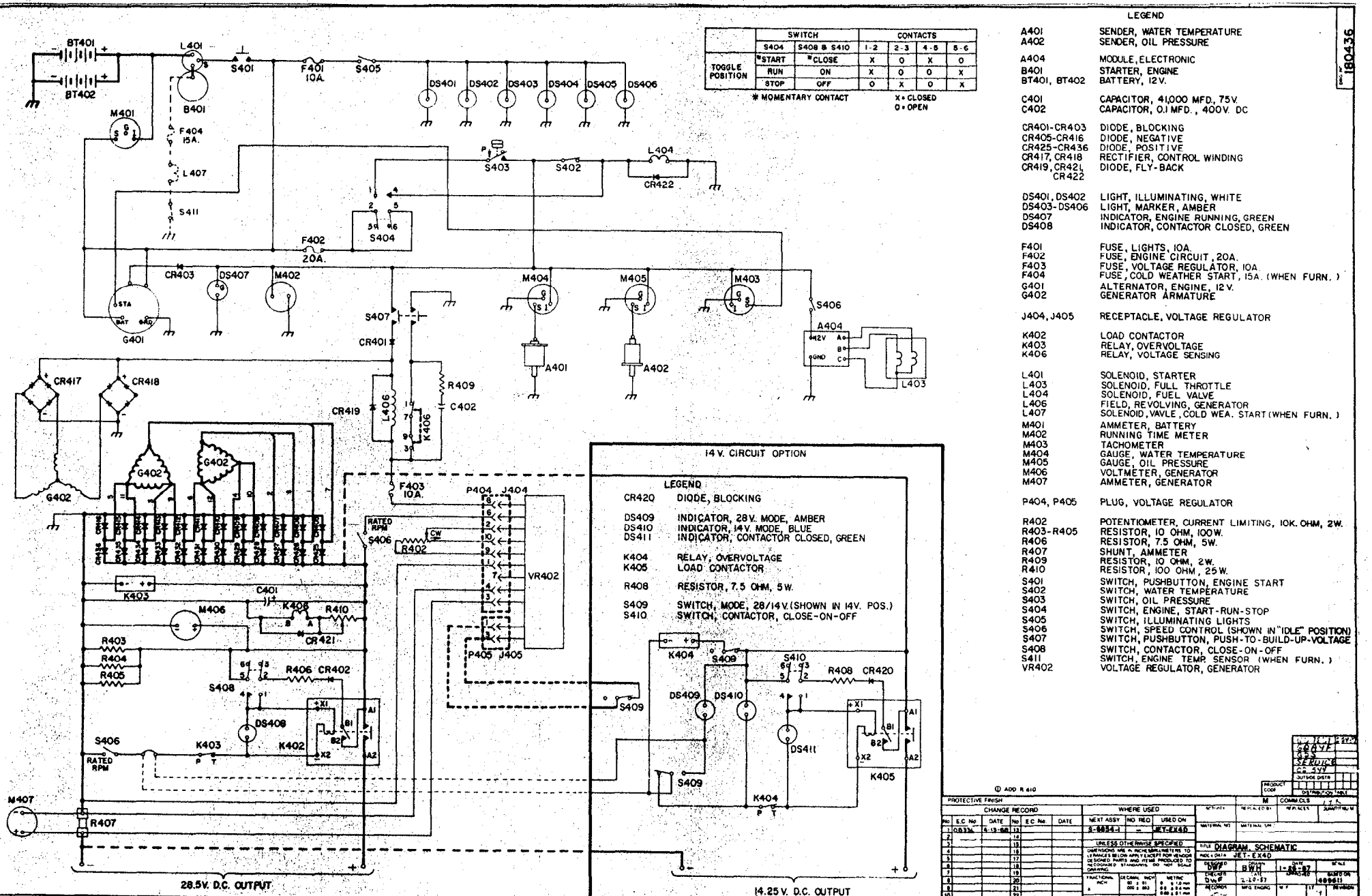

	SWITCH		CONTACTS			
	S404	S408 & S410	1-2	2-3	4-5	5-6
TOGGLE POSITION	*START	*CLOSE	X	O	X	O
	RUN	ON	X	O	O	X
	STOP	OFF	O	X	O	X

* MOMENTARY CONTACT

X = CLOSED
O = OPEN

LEGEND

A401	SENDER, WATER TEMPERATURE
A402	SENDER, OIL PRESSURE
A404	MODULE, ELECTRONIC
B401	STARTER, ENGINE
BT401, BT402	BATTERY, 12V.
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L407	SOLENOID, VAVLE, COLD WEA. START (WHEN FURN.)
M401	AMMETER, BATTERY
M402	RUNNING TIME METER
M403	TACHOMETER
M404	GAUGE, WATER TEMPERATURE
M405	GAUGE, OIL PRESSURE
M406	VOLTMETER, GENERATOR
M407	AMMETER, GENERATOR
P404, P405	PLUG, VOLTAGE REGULATOR
R402	POTENTIOMETER, CURRENT LIMITING, 10K. OHM, 2W.
R403-R405	RESISTOR, 10 OHM, 100W.
R406	RESISTOR, 7.5 OHM, 5W.
R407	SHUNT, AMMETER
R409	RESISTOR, 10 OHM, 2W.
R410	RESISTOR, 100 OHM, 25W.
S401	SWITCH, PUSHBUTTON, ENGINE START
S402	SWITCH, WATER TEMPERATURE
S403	SWITCH, OIL PRESSURE
S404	SWITCH, ENGINE, START-RUN-STOP
S405	SWITCH, ILLUMINATING LIGHTS
S406	SWITCH, SPEED CONTROL (SHOWN IN "IDLE" POSITION)
S407	SWITCH, PUSHBUTTON, PUSH-TO-BUILD-UP-VOLTAGE
S408	SWITCH, CONTACTOR, CLOSE-ON-OFF
S411	SWITCH, ENGINE TEMP. SENSOR (WHEN FURN.)
VR402	VOLTAGE REGULATOR, GENERATOR

DWG # 180436

① ADD R 410

PROTECTIVE FINISH

CHANGE RECORD

NO	E.C. No.	DATE
1	0833A	6-13-68

WHERE USED

NEXT ASSY	NO REQ	USED ON
S-6854-1	--	JET-EX40

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES. TOLERANCES ARE IN MILLIMETERS TO 1 DECIMAL PLACE. TOLERANCES BELOW APPLY EXCEPT FOR VENDOR DESIGNED PARTS AND ITEMS PRODUCED TO RECOGNIZED STANDARDS. DO NOT SCALE DRAWING.

FRACTIONAL INCH ± | DECIMAL INCH .XX ± .01, .XXX ± .005 | METRIC .X ± 0.2 mm, .XX ± 0.1 mm, .XXX ± 0.01 mm

ANGLES ± 30'

SURFACE TEXTURE

MATERIAL NO | MATERIAL SPEC | MATERIAL SIZE | QUANTITY REQ'D

TITLE DIAGRAM, SCHEMATIC

INDEX DATA JET-EX40

DESIGNED DW | DRAWN BWH | DATE 1-25-67 | SCALE

CHECKED DW # | DATE 2-20-67 | DRAWING NO. 180436

RECORDS | MFG. ENGRG | W.P. | LT | REVISION

HOBART BROS. CO. TROY, OHIO 45373 U.S.A. | SIZE D | DWG NO. 180436

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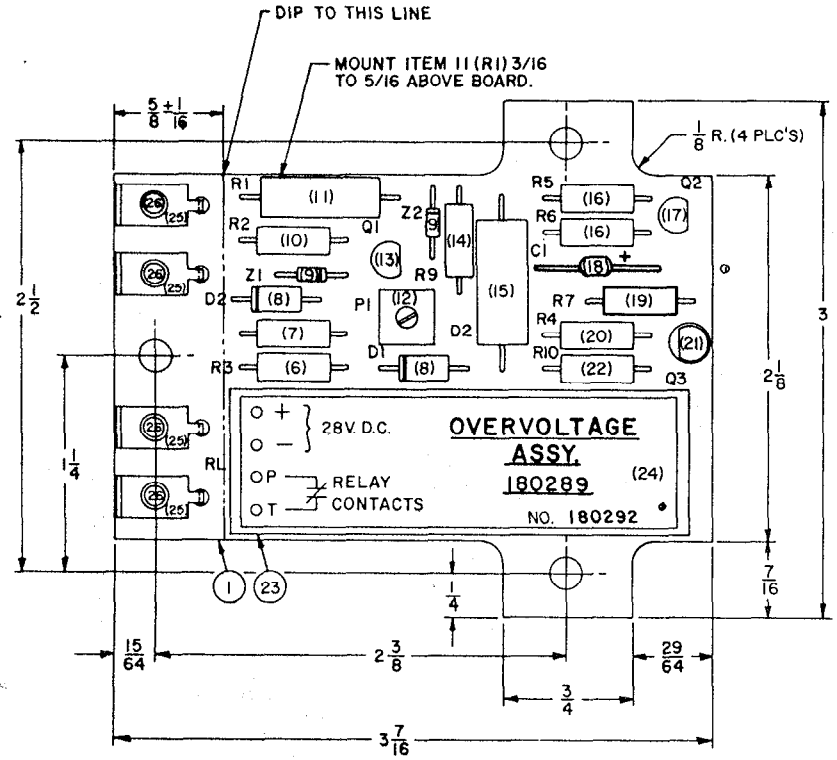
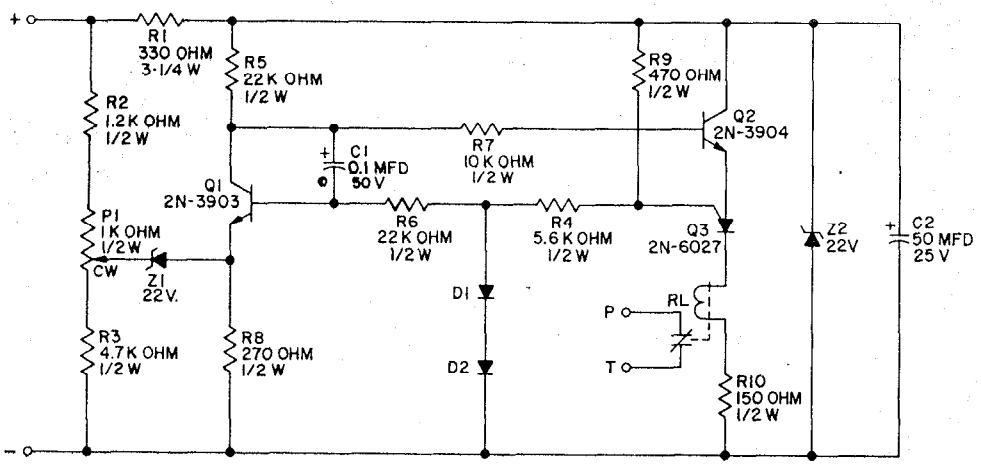


TITLE: BOARD, P.C., OVERVOLTAGE, AY.		DRAWING NO. 180289	
ITEM	DESCRIPTION	DRAWING NO.	R
1 2 3	BOARD, P.C. OVERVOLTAGE	403766B	1
4 5 6	RESISTOR, 4.7K OHM, 1/2 WATT	W-10827-12	1
7	RESISTOR, 270 OHM, 1/2 WATT	W-10827-7	1
8	DIODE, SILICON, 400 PRV, 1.5 A.	ICZ-93B	2
9	DIODE, ZENER, 22 V.	401429-1	2
10	RESISTOR, 1.2K OHM, 1/2 WATT	W-10827-1	1
11	RESISTOR, 330 OHM, 3-1/4 WATT	401435-3	1
12	POTENTIOMETER, 1K OHM, 1/2 WATT	402794-1	1
13	TRANSISTOR, 2N-3903	400760-1	1
14	RESISTOR, 470 OHM, 1/2 WATT	W-10827-8	1
15	CAPACITOR, 50 MFD, 25 VOLTS	406135-5	1
16	RESISTOR, 22K OHM, 1/2 WATT	W-10827-18	2
17	TRANSISTOR, 2N-3904	400760-2	1
18	CAPACITOR, .1uF, 50 VOLTS	405941-3	1
19	RESISTOR, 10K OHM, 1/2 WATT	W-10827-17	1
20	RESISTOR, 5.6K OHM, 1/2 WATT	W-10827-22	1
21	TRANSISTOR, UNIJ, PROGRAMMABLE	402462	1
22	RESISTOR, 150 OHM, 1/2 WATT	W-10827-44	1
23	RELAY, PROTECTIVE MONITOR, 12V.	403198	1
Ⓓ 24	LABEL, IDENT. & INSTRUCTION	180292	1
25	CONNECTOR, FASTON, RIGHT ANGLE	422640	4
26	RIVET, BLIND, ALUM.	403593-1	4

LEGEND

C1	CAPACITOR, .1uF, 50 V.
C2	CAPACITOR 50 MFD, 25 V.
D1, D2	DIODE
P1	POTENTIOMETER, 1K OHM, 1/2 WATT
Q1	TRANSISTOR 2N-3903
Q2	TRANSISTOR 2N-3904
Q3	TRANSISTOR PROGRAMMABLE UNIJ-2N-6027
R1	RESISTOR 330 OHM, 3-1/4 WATT
R2	RESISTOR 1.2 K OHM, 1/2 WATT
R3	RESISTOR 4.7 K OHM, 1/2 WATT
R4	RESISTOR 5.6 K OHM, 1/2 WATT
R5, R6	RESISTOR 22 K OHM, 1/2 WATT
R7	RESISTOR 10K OHM, 1/2 WATT
R8	RESISTOR 270 OHM, 1/2 WATT
R9	RESISTOR 470 OHM, 1/2 WATT
R10	RESISTOR 150 OHM, 1/2 WATT
RL	RELAY
Z1, Z2	ZENER 22 VOLT



TEST EQUIPMENT NEEDED

FILTERED AND FUSED DC POWER SUPPY 20 TO 40 VOLTS, STOP WATCH, AND VOLT AND OHMMETER.

TEST INSTRUCTIONS

1. CONNECT A 12 VOLT BULB IN SERIES WITH P & T, BULB WILL LIGHT.
2. CONNECT DC POWER SUPPLY TO PLUS AND MINUS OF THE P.C. BOARD.
3. ADJUST P1 TO TRIP (LIGHT WILL GO OUT), AT 32 VOLTS IN 0.4-0.5 SECONDS. RELAY IS NOT TO TRIP AT 31 VOLTS. Ⓓ
4. WITH 35 VOLT INPUT, CHECK FOR TRIP TIME TO BE APPROXIMATELY 0.3 SECONDS.
5. WITH 40 VOLT INPUT, TRIP TIME TO BE APPOX. 0.2 SECONDS. Ⓓ

02-553 9-19-86

OUTSIDE DISTR.

DISTRIBUTION TABLE

PROTECTIVE FINISH 910320

CHANGE RECORD

No.	INDEX	DATE	No.	INDEX	DATE
1			14		
2			15		
3			16		
4			17		
5			18		
6			19		
7			20		
8			21		
9			22		
10			23		
11			24		
12					

WHERE USED

NEXT ASSY.	NO. REQ.	USED ON

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES. DO NOT SCALE DRAWING. TOLERANCES BELOW APPLY EXCEPT FOR VENDOR DESIGNED PARTS AND ITEMS PRODUCED TO RECOGNIZED STANDARDS.
SURFACE TEXTURE

FRACTIONS	DECIMALS	ANGLES
±	.00 ± .01 .000 ± .003	± 30'

ACTIVITY	REPLACED BY	ACCESS NO. 0280-01
MATERIAL NO.	MATERIAL SPEC. ASSEMBLY	QUANTITY/A.M.

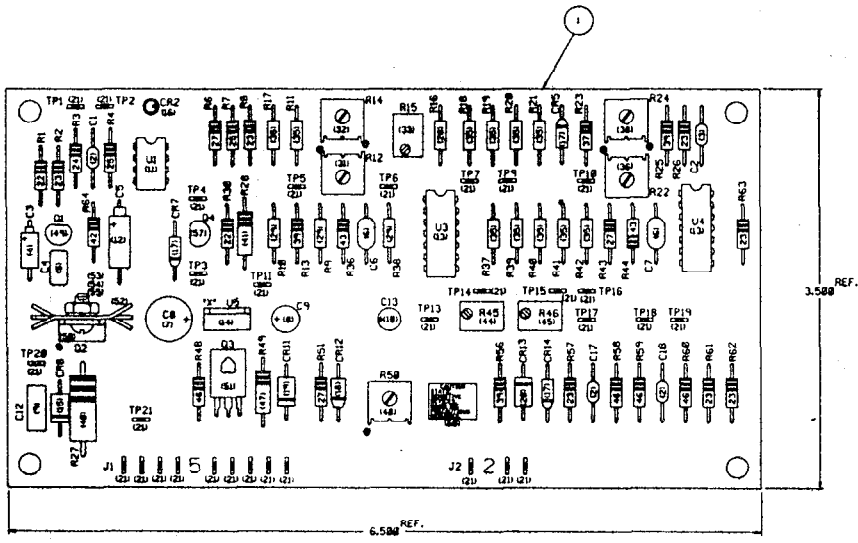
TITLE BOARD, P.C., OVERVOLTAGE, AY.
INDEX DATA

DESIGNED	DRAWN	DATE	SCALE
JBT	BJH	9-16-86	2/1
CHECKED	DATE	APPROVED	REPLACES
		JKC 9/22	
RELEASED	DATE	SHEET	REV.
SAS		J	7

HOBART BROS. CO. TROY, OHIO 45373 U.S.A.
SIZE
DWG. NO. 180289

Ⓓ .33 MFD. IS NOW 0.1 MFD.

CONFIDENTIAL: This drawing, including all information contained thereon, is the exclusive and confidential property of Hobart Brothers Company of Troy, Ohio, and is not to be copied, reproduced or delivered or disclosed to others, in whole or in part, except with written permission.



TITLE: BOARD,PC,VOLTAGE REGULATOR,AY		DRAWING NO. 489788	
ITEM	DESCRIPTION	REF. DESIGNATOR	DWG. NO.	REQ.
1	BOARD,PC,VOLTAGE REGULATOR	NONE	486452	1
2	CAPACITOR,CERAMIC, .01 MFD 50V	C1,7,10	485941-E	3
3	CAPACITOR,CERAMIC, .0022 MFD 50V	C2	485941-5	1
4	CAPACITOR,TANT., 2.2 MFD 20V	C3	488038-6	1
5	CAPACITOR,CERAMIC,RADIAL, 1.0 MFD 50VDC	C4	486357-1	1
6	CAPACITOR,CERAMIC, .1 MFD 50VDC	C6,9	485941-3	2
7	CAPACITOR,ALUM.ELEC.,RADIAL,100 MFD 35VDC	C8	485865-4	1
8	CAPACITOR,ALUM.ELEC.,RADIAL,10 MFD 35VDC	C11	485865-2	1
9	CAPACITOR,POLY.FILM,.047 MFD 250VDC	C12	485279-8	1
10	CAPACITOR,ALUM.ELEC.,RADIAL, 1 MFD 50VDC	C13	485865-1	1
11	CIRCUIT,INT., POWER SUPPLY,CONTROLLER	U1	486814-1	1
12	CAPACITOR,TANT., 10 MFD 20V	C5	482796-3	1
13	CIRCUIT,INT., OP AMP,QUAD,LM324N	U3,4	486776-1	2
14	CIRCUIT,INT., VOLTAGE REGULATOR,+12VDC	U5	486168-2	1
15	DIODE,TRANSIENT,VOLT PROT,1 AMP 400V	CR6	483867-1	1
16	DIODE,LIGHT EMITTING,GREEN	CR2	485621	1
17	DIODE,SILICON,100mA 100PRV, 1N4148	CR5,7,14	485266-1	3
18	DIODE,SILICON,1.5A 400PRV, 1N5395	CR12	IC2-938	1
19	DIODE,ZENER, 1BV 1W, 1N4748	CR11	481429-2	1
20	DIODE,ZENER, 6.2V 1W, 1N4736A	CR13	481429-7	1
21	POST,MACH INSERTABLE	J1-2,TP1-7,9-11,13-21	485145-1	36
22	RESISTOR,CARBON, 15K OHM	R1,38	485148-36	2
23	RESISTOR,CARBON, 18K OHM	R2,8,26,57,61,62,63	485148-3	7
24	RESISTOR,CARBON, 3MEG OHM 1/4W 5%	R3	485148-38	1
25	RESISTOR,CARBON, 4.7K OHM	R4,7	485148-2	2
26				
27	RESISTOR,CARBON, 1K OHM	R6,43,51	485148-1	3
28	RESISTOR,METAL FILM, 49.9K OHM 1/4W 1%	R16	486298-39	1
29	RESISTOR,METAL FILM, 25.5K OHM 1/4W 1%	R9,18,36	486298-57	3
30				
31	POTENTIOMETER,TRIM,SINGLE TURN, 10K, 1/2W	R12	486158-3	1
32	POTENTIOMETER,TRIM,SINGLE TURN, 5K, 1/2W	R14	486158-2	1
33	POTENTIOMETER,TRIM,MULTI-TURN, 500K 1/2W	R15	485495-9	1
34				
35	RESISTOR,METAL FILM, 100K OHM 1/4W 1%	R11,17,19,28,21,37,39 40,41,42	486298-3	11
36	POTENTIOMETER,TRIM,SINGLE TURN, 500, 1/2W	R22	486158-9	1
37	RESISTOR,CARBON, 100K OHM	R23	485148-28	1
38	POTENTIOMETER,TRIM,SINGLE TURN, 1K 1/2W	R24	486158-1	1
39	RESISTOR,CARBON, 3.3K OHM	R3,32,0,66	485148-30	3
40	RESISTOR,CARBON, 1.8K OHM 1W 5%	R27	488872-18	1
41	RESISTOR,CARBON, 470 1/2W	R28	W-10827-8	1
42	RESISTOR,CARBON, 680 OHM	R64	485148-37	1
43	RESISTOR,CARBON, 100 OHM	R30,44	485148-10	2
44	POTENTIOMETER,TRIM,MULTI-TURN, 25K 1/2W	R45	485495-5	1
45	POTENTIOMETER,TRIM,MULTI-TURN, 5K 1/2W	R46	485495-3	1
46	RESISTOR,CARBON, 470 OHM	R48,58,59,60	485148-29	4
47	RESISTOR,CARBON, 1K OHM 1/2W	R49	W-10827-4	1
48	POTENTIOMETER,TRIM,SINGLE TURN, 25K 1/2W	R50	486158-7	1
49	TRANSISTOR, PNP, 2N3906	Q1	488760-6	1
50	TRANSISTOR, SCR,10A 500V (SEE NOTE 8)	Q2	488815A-1	1
51	TRANSISTOR, POWER,NPN, 2N4923	Q3	482450-3	1
52	HEATSINK,PC BOARD (SEE NOTE 8)	NONE	485695	1
53	WASHER,N.I.,T=.04	NONE	W-11160-8	1
54	SCREW,4-40 X 3/8,RD HD MA,BT	NONE	W-11089-1	1
55	NUT,4-40,HEX	NONE	W-11287-1	1
56	LABEL,PC BOARD,(NOT SHOWN SEE NOTE 11)	NONE	483981	--
57	TRANSISTOR, SMALL SIGNAL,NPN, MPS2222A	Q4	486584-1	1
58	TEST INSTRUCTIONS	----	SEE BELOW	--
59	INSTRUCTIONS, BOARD		CR7421	
60	LABEL, CAUTION,STATIC SENSITIVE	----	487478	1

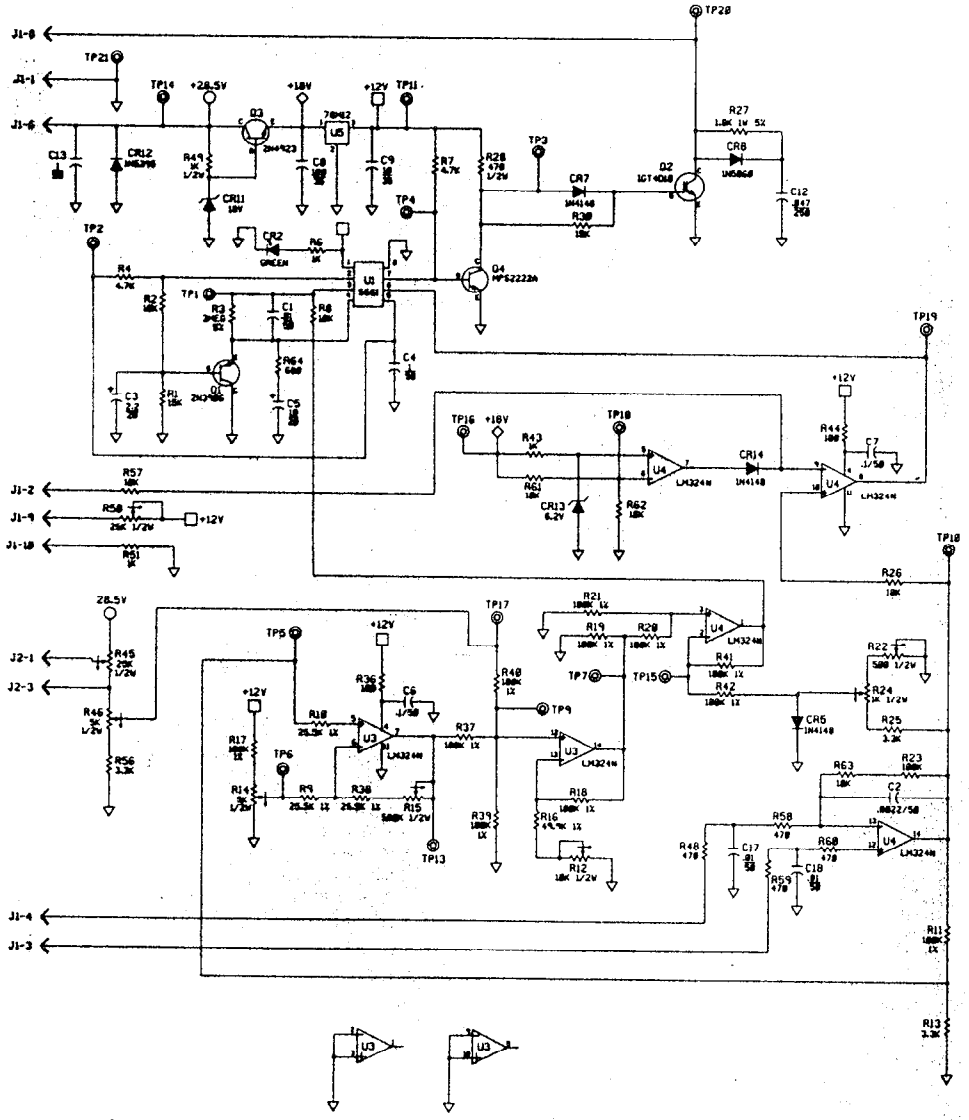
NOTES:
1. PRINT LABEL ITEM 56(PER MANUF.INST. 910351.
2. "X" BESIDE US INDICATES METAL SIDE OF PACKAGE. THERE IS NO "X" ON ACTUAL PART.
3. RESISTORS ARE 1/4W 10% UNLESS OTHERWISE SPECIFIED.
4. CAPACITOR VOLTAGES ARE MINIMUM.
5. APPLY HEATSINK COMPOUND 483948 BETWEEN Q2 AND HEATSINK.
6. FOR SUPPLY REGULATORS-TEST IN JET-EX 40 SYSTEM PER PARAS 23 THROUGH 27 OF T.I. 489963. A 40 MIL BLANK MAY BE SUBSTITUTED FOR STEP 26 IF Q2 IS LOADED TO 5 AMPS.
7. FOR SUPPLY REGULATORS-TEST IN JET-EX 40 SYSTEM PER PARAS 26 THROUGH 30 OF T.I. 488881. A 40 MIL BLANK MAY BE SUBSTITUTED FOR STEP 29 IF Q2 IS LOADED TO 5 AMPS.
8. MASK THE HEATSINK AND POWER TRANSISTOR Q2 DURING CONFORMAL COATING.
9. CUT CIRCUIT PATH BETWEEN PINS 1 & 2 AND 8 & 9 OF DIP AMP U-2.

Caution
Static Sensitive Devices
Handle Only With Static Safe Techniques

DWG. NO.	WHERE USED	TEST INSTRUCTIONS	PART NO.
489788-1	S-6854	489958-1 (NOTE 6)	489788
489788-2	S-6813	489958-2 (NOTE 7)	489788

PROTECTIVE FINISH CONFORMAL COAT PER MANUF INST 910328

| CHANGE RECORD | | | |



LEGEND

C1,17,18	CAPACITOR,CERAMIC, .01 MFD 50VDC
C2	CAPACITOR,CERAMIC, .0822 MFD 50VDC
C3	CAPACITOR,TANT., 2.2 MFD 20VDC
C4	CAPACITOR,CERAMIC,RADIAL,.1 MFD 50VDC
⊕ C5	CAPACITOR,TANT., 10 MFD 20VDC
C6,7	CAPACITOR,CERAMIC,.1 MFD 50VDC
C8	CAPACITOR,ALUM. ELEC.,RADIAL,100 MFD 35VDC
C9	CAPACITOR,ALUM. ELEC.,RADIAL,10 MFD 35VDC
C12	CAPACITOR,STK FILM,.847 MFD 250 WVDC
C13	CAPACITOR,ALUM. ELEC.,RADIAL,1 MFD 50VDC
CR2	DIODE,LIGHT EMITTING,GREEN
CR5,7,14	DIODE,SILICON,100 mA 100PRV,1N4148 OR EQUIV.
CR12	DIODE,SILICON,1.5A 400PRV,1N5398 OR EQUIV.
CR11	DIODE,ZENER,18V 1W,1N4746 OR EQUIV.
CR13	DIODE,ZENER,6.2V 1W,1N4730A OR EQUIV.
CR8	DIODE,TRANSIENT,VOLT PROT,1A 400PRV,1N5868 OR EQUIV.
J1	CONNECTOR,10 POSITION
J2	CONNECTOR,4 POSITION
Q1	TRANSISTOR,PNP,2N3906 OR EQUIV.
Q2	TRANSISTOR,MOSFET,1.6A 500V,IGT40J8 OR EQU
Q3	TRANSISTOR,POWER,NPN,2N6423 OR EQUIV.
Q4	TRANSISTOR,SMALL SIGNAL,NPN,MPS2222A OR EQUIV.
R1,30	RESISTOR,CARBON, 15K OHM 1/4W
⊕ R2,8,26,57,61,62,63	RESISTOR,CARBON, 10K OHM 1/4W
R3	RESISTOR,CARBON, 3MEG OHM 1/4W 5%
R4,7	RESISTOR,CARBON, 4.7K OHM 1/4W
R6,43,51	RESISTOR,CARBON, 1K OHM 1/4W
R16	RESISTOR,METAL FILM, 45.3K OHM 1/4W 1%
⊕ R5,18,38	RESISTOR,METAL FILM, 25.5K OHM 1/4W 1%
R12	POTENTIOMETER,TRIM,SINGLE TURN,10K OHM 1/2W 10%
R14	POTENTIOMETER,TRIM,SINGLE TURN, 5K OHM 1/2W 10%
R15	POTENTIOMETER,TRIM,MULTI-TURN, 500K OHM 1/2W
⊕	
⊕ R11,17-21,37,39,48-62	RESISTOR,METAL FILM, 100K 1/4W 1%
R22	POTENTIOMETER,TRIM,SINGLE TURN,500 OHM,1/2W
R23	RESISTOR,CARBON, 100K OHM 1/4W
R24	POTENTIOMETER,TRIM,SINGLE TURN, 1K OHM 1/2W 10%
⊕ R13,25,56	RESISTOR,CARBON, 3.3K OHM 1/4W
R27	RESISTOR,CARBON, 1.8K OHM 1W 5%
R28	RESISTOR,CARBON, 470 OHM 1/2W
R36,44	RESISTOR,CARBON, 100 OHM 1/4W
⊕	
R45	POTENTIOMETER,TRIM,MULTI-TURN, 25K OHM 1/2W
R46	POTENTIOMETER,TRIM,MULTI-TURN, 5K OHM 1/2W
R48,58,59,60	RESISTOR,CARBON, 470 OHM 1/4W
R49	RESISTOR,CARBON, 1K OHM 1/2W
R50	POTENTIOMETER,TRIM,SINGLE TURN, 25K OHM 1/2W 10%
R64	RESISTOR,CARBON, 680 OHM 1/4W
TP1-7,9-11,13-21	POST,TEST POINT
U1	CIRCUIT,INT., POWER SUPPLY CONTROLLER,NE5561 OR EQUIV.
⊕ U3,4	CIRCUIT,INT., OP AMP,QUADL,M324N OR EQUIV.
U5	CIRCUIT,INT., VOLTAGE REGULATOR,+12VDC,78M12 OR EQUIV.

NOTES:

1. ALL RESISTORS ARE 1/4W 10% UNLESS SPECIFIED OTHERWISE
2. CAPACITOR VOLTAGES ARE MINIMUM
3. ALL GROUNDS ARE COMMON

PC BOARD NUMBER	489452
CAD FILENAME	(438.3)489778.SCH
SUPPORT FILENAME	(438.2)489778.BRD
CELL FILENAME	(438.1)PCBSCN.CEL
PLOT DATE	11-84-87

| | | |

UNUSUAL SERVICE CONDITIONS

This information is a general guideline and cannot cover all possible conditions of equipment use. The specific local environments may be dependent upon conditions beyond the manufacturer's control. The manufacturer should be consulted if any unusual conditions of use exist which may affect the physical condition or operation of the equipment.

Among such conditions are:

1. Exposure to:

   A. Combustible, explosive, abrasive or conducting dusts.

   B. Environments where the accumulation of lint or excessive dirt will interfere with normal ventilation.

   C. Chemical fumes, flammable or explosive gases.

   D. Nuclear radiation.

   E. Steam, salt-laden air, or oil vapor.

   F. Damp or very dry locations, radiant heat, vermin infestation, or atmospheres conducive to fungus growth.

   G. Abnormal shock, vibration or mechanical loading from external sources during equipment operation.

   H. Abnormal axial or side thrust imposed on rotating equipment shafts.

   I. Low and/or high ambient temperatures.

   J. High electromagnetic fields.

2. Operation at:

   A. Voltages above or below rated voltage.
   B. Speeds other than rated speed.
   C. Frequency other than rated frequency.
   D. Standstill with rotating equipment windings energized.
   E. Unbalanced voltages.
   F. Operation at loads greater than rated.

3. Operation where low acoustical noise levels are required.

4. Operation with:

   A. Improper fuel, lubricants or coolant.
   B. Parts or elements unauthorized by the manufacturer.
   C. Unauthorized modifications.

5. Operation in poorly ventilated areas.